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ORIGINAL COMMUNICATIONS.

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PRE-TURBINAL OPERATION ON THE MAXILLARY SINUS.*

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In 1908, at the meeting of the American Medical Association in Chicago, Canfield described a new method of operating intra-nasally on the maxillary sinus. This was termed, "the submucous resection of the lateral nasal wall in chronic empyema of the antrum."

This method was based upon an entirely new principle, that is, making an extensive resection of the lateral wall of the nose submucously through a comparatively small incision in front of the anterior attachment of the inferior turbinate, (Figure 1). The bony structure of the inferior turbinate was then removed with a corresponding amount of the osseus wall forming the inferior nasal passage. A portion of the crista pyriformis corresponding to the inner part of the anterior antral wall was then resected, and a flap formed from the mucosa of the inferior nasal passage was turned and packed with vaseline gauze onto the antral floor; thus completing the operation, (Figures 2 and 3). By this method not only could the interior of the maxillary sinus be inspected but a large, permanent opening into the nose was created, extending practically the entire length of the inferior turbinate.

The after-treatment consisted in removing the gauze on the fourth or fifth day and touching subsequent granulation-tissue with pure nitrate of silver. Complete healing occurred in from ten days to three months. The author claimed the following advantages for his method: 1. It may be used as a substitute for the Caldwell-Luc, as it is quite as radical without having the incision through the

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mouth. 2. A direct view into the antrum is obtained. 3. The after-treatment is simplified and often unnecessary.

During the discussion which followed, a number of exceptions to the method were taken. Thus J. W. Murphy thought that removal of so much of the wall was a rather heroic procedure.

Jansen of Berlin, condemned the use of the flap, as instead of furthering the growth of the epithelium on the floor of the sinus it actually prevented it and lengthened the time of healing. Freer regarded the operation as needlessly formidable and elaborate for all but the extremely rare case in which the severity is marked.

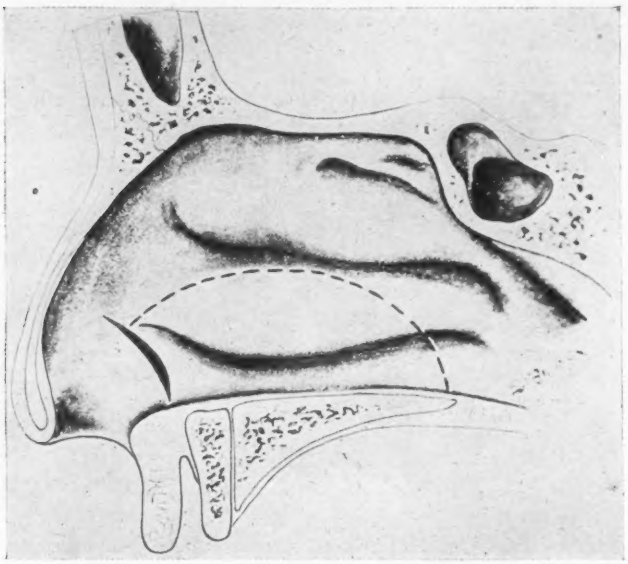

Figure 1.

Other speakers condemned the removal of the lower turbinate bone, as the subsequent shrinkage would cause widening of the nasal lumen; thus favoring atrophic rhinitis.

After careful consideration of the different phases of this method one must draw the following conclusions: 1. It is too extensive and involves the loss of tissue which is important for the nose to properly perform its physiological function, (bony structure of inferior turbinate). 2. The submucous resection is difficult, tedious and unnecessary. 3. The same results can be obtained by a similar operation of less magnitude.

Sturmann, in 1910, brought out a similar operation but without the submucous resection. His idea was to make the procedure an intra-nasal Denker operation, that is the incision being made in the nose instead of in the mouth.

The method was as follows: The inferior nasal passage and canine fossa on the affected side were painted with a 20 per cent solution of cocain. A solution of cocain adrenalin was then injected under the periosteum on both the facial and nasal side of the crista pyriformis.

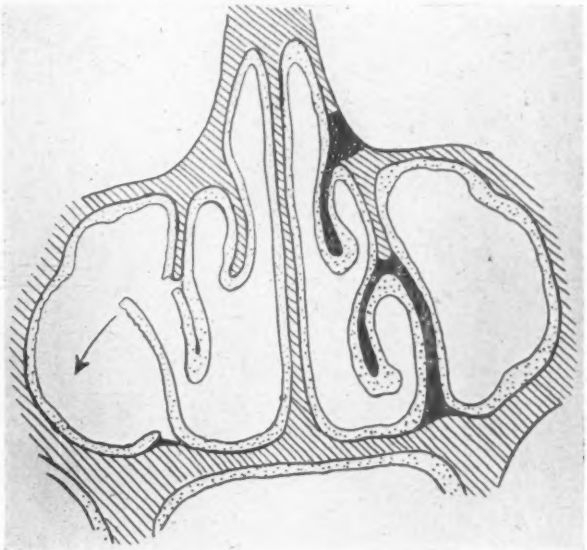

Figure 2.

After anesthesia was complete an incision was made in front of the inferior turbinate and the crista pyriformis exposed. Submucous resection was made on the nasal side, sub-periosteal resection on the facial. The crista pyriformis was then removed with bone-forceps, drills, etc., and as much of the facial and nasal bony walls as was necessary in order to directly inspect all parts of the sinus cavity including the roof. The sinus was cleansed with tampons saturated in H_2O_2, and a mucous membrane flap made from the lateral nasal wall directly behind the incision and turned backward into the sinus and along its floor. This flap was held in position with a tight tampon of iodoform gauze which was allowed to remain five days. Tampons were then changed every two days for

two weeks, then omitted. Complete healing occurred in from four to seven weeks.

These operations, while presenting a great advancement in surgical technic nevertheless left something to be desired, the first (Canfield's) being too difficult and extensive, the second (Sturmann's) being over-radical by removing too much of the bony structure as well as several minor defects (retention of flap, etc.). This form of operation, however, always appealed strongly to me, and during the application of these methods the following technic

Figure 3.

seemed to take its place through a series of gradual evolutions until it has now become in our department the standard intra-nasal operation on the maxillary sinus, whenever an intra-nasal procedure is indicated. It has always been done under local anesthesia, although general may just as readily be employed.

1. The nasal cavities on both sides are cleansed by douches of warm normal saline solution.

2. The entrance to the nose, including that portion immediately in front of the anterior attachment of the inferior turbinate both above and below, is anesthetized by painting with a solution of

cocain, 20 per cent, to which 1-5 its volume of adrenalin chlorid has been added.

3. When the anesthetization is complete a solution containing novocain 1 per cent, adrenalin chlorid 1-10,000, peptone pure 10 per cent, normal salt solution 89 per cent is injected beneath the mucosa on the nasal side of the pyriform aperture and sub-periosteally on the facial side of the same structure, so that all that region around the anterior attachment of the inferior turbinate as well as the inner portion of the canine fossa wall will be desensitized. It

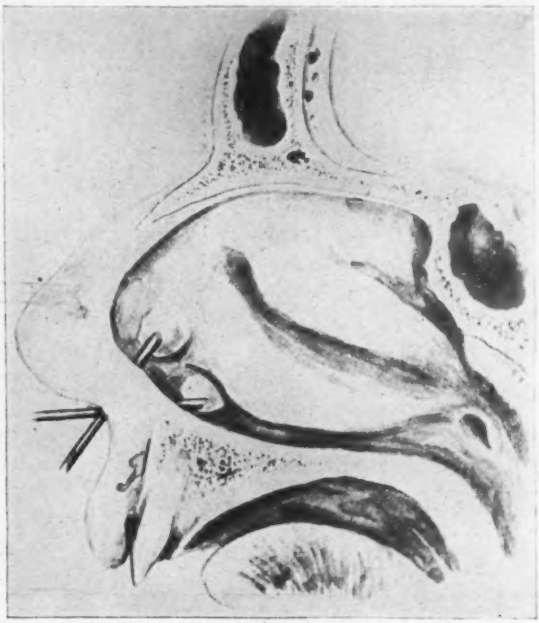

Figure 4.

will not be necessary to use much over 5-6 cc., (80-100 gtts.). (Figure 4.)

4. After waiting about ten minutes a perpendicular incision is made slightly in front and above the anterior end of the inferior turbinate extending well into the floor of the nose. This incision should sever all tissues down to the bone. A second incision is made directly back of this, meeting the first one above and below so as to excise a spindle-shaped piece of mucous membrane, (Figure 5).

5. After controlling hemorrhage with adrenalin tampons, a small elevator is used to raise the periosteum from the crista pyriformis both externally toward the canine fossa and internally toward the inferior turbinate until a sufficient portion of the bone is exposed, (Figure 6).

6. The antrum is now attacked with a chisel having a concave surface, by applying it to the crista pyriformis first above, then below, removing the loosened bone with a pair of strong forceps. While the antrum may be opened by continuing this method it is better to substitute an electric trephine, as a smooth, round opening

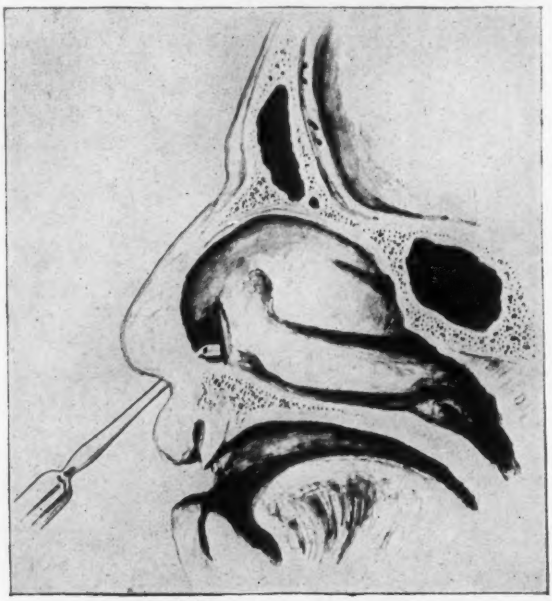

Figure 5.

is thus obtained and insures against spicules of bone being driven into the sinus.

7. Enlarge the opening to any desired size by means of the ordinary curved, frontal sinus rasps.

8. Flush out the sinus and after drying pack a thin strip of gauze saturated in the cocain adrenalin solution and allow it to remain five minutes. This not only anesthetizes the mucosa, but also by its hemostatic action clears the cavity of blood and permits a much more satisfactory inspection of the interior, (Figure 7).

9. Introduce an ordinary hard rubber ear speculum into the opening and thoroughly inspect the antrum for polypoid degenerated mucosa, areas of granulation tissue, necrotic spaces, etc. This procedure is readily accomplished if sufficient bone has been removed. The naso-pharyngoscope is used for inspection of the roof, lacrimal region and ostium.

10. Introduce a curette and remove all portions of diseased and degenerated mucosa, not overlooking the floor, posterior-inferior and antero-superior angles; the latter can only be reached by a right angle curette.

11. Again inspect the interior of the sinus, using cotton or gauze pledgets dipped in pure adrenalin chlorid when necessary for cleansing purposes. If all polypoid tissue seems to have been re-

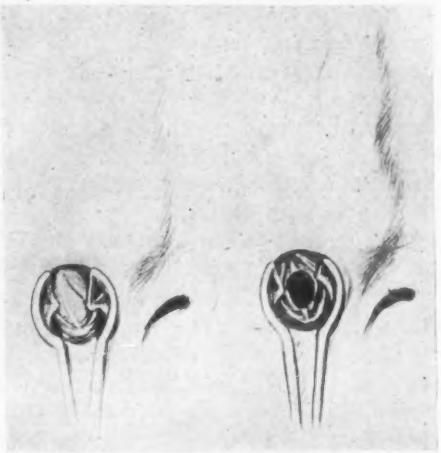

Figure 6. Figure 7.

moved and the cavity clean, again irrigate and after allowing the fluid to run out, pack loosely with iodoform tape.

After-treatment: The gauze is removed in forty-eight to seventy-two hours, depending upon the amount of secretion. If it remain moderately dry it can be permitted to remain even as long as one week. After its removal the cavity should be cleansed by irrigation and lightly repacked with iodoform gauze. The treatments are continued every second day for ten days to two weeks when the packing can be permanently discontinued. It is remarkable how quickly the discharge lessens after the packing is abandoned.

The treatments (irrigation and insufflation) are continued at increasing intervals for about four weeks, when in ordinary cases the

patient is discharged cured. Certain cases, however, in which the permanent pathological changes in the mucosa had necessitated the removal of large areas of the lining-membrane and in which one of the forms of the external radical operations was indicated, require longer and more energetic after-treatment to promote granulation and cicatrization of the already enfeebled tissues. In these cases the discharge continues with little change after the packing has been discontinued. After thorough cleansing and drying one ounce of a 25 per cent solution of nitrate of silver is slowly injected and allowed to remain five minutes, the patient bending the head toward the shoulder of the affected side. This is continued every second day, the silver solution being used in increasing strength, (to 75 per cent), if the weaker solutions do not appear to be sufficiently stimulating. It is surprising how little discomfort these injections cause, practically no more than the like quantity of sterile water.

Precise information regarding the healing and general condition of the sinus interior can always be obtained by means of the nasopharyngoscope and I know of no condition in which the use of this little instrument gives more satisfaction than after this operation. Small areas, such as necrotic spots and suppurating foci, which refuse to heal are easily located and directly treated with pure silver nitrate. Then re-inspected to ascertain whether all parts have been touched. In this manner final and definite healing is brought about.

During the after-treatment it is always necessary to keep the artificial opening of the sinus in mind, as it shows a marked tendency to close with astonishing rapidity. This can be prevented by occasionally curetting the edges and applying a caustic. While the gauze packing is in place this will not occur, and indeed, this is one of the reasons for the several re-packings. After healing has been established this opening will gradually close until that side of the nose is to all intents and purposes quite as normal in appearance as the opposite side.

The advantages over other intra-nasal procedures are: 1. The sinus can always be inspected either directly or through the nasopharyngoscope and the progress of healing noted. 2. The drainage is at the lowest and most accessible point reached through the nose. 3. Local applications directly under vision can be made to diseased areas which have proved resisting to treatment. 4. The inferior turbinate is not only preserved in its entity but remains uninjured. 5. The operation is practically painless if the anesthetization is properly carried out. 6. The period of healing is considerably shortened and the number of after-treatments greatly decreased.

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EXTRACTS AND THOUGHTS FROM A SINUS CLASSIC.

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Ten years' attendance at medical meetings where the nasal sinuses were under discussion have emphasized for the writer the fact that there are truly "many men of many minds." Further, it is not at all uncommon to find a man who advocates one thing at a gathering this year, and takes an entirely different stand a year hence.

This diversity of opinion cannot make for good. Truth is one. Given two contradictory statements, it is possible to say that they are both wrong, or, that one is right and the other wrong. But under no conceivable circumstances can they both be right. Opinion is a personal privilege, the inalienable right of everyone. Only absolutism would seek to abolish it. But opinion to be of value must be in consonance with fact. The moment it conflicts with fact it becomes fallacy.

The variety of opinion filling the records of national and local societies, as well as the current American literature, on matters pertaining to the nasal sinuses, furnishes the writer the opportunity to recall to the attention of the medical profession a sinus school which is undoubtedly one in opinion, and which its disciples, to the number of some four thousand scattered to all parts of the globe, believe to be one in fact. From this point on, for the sake of simplicity, the writer will use the editorial "we" as representing this school, freely acknowledging his inability to do more than give a most superficial survey of thirty years' labor.

In the year 1887, to be exact, there was founded in Vienna, a course on the anatomy of the nasal sinuses by Docent Marcus Hajek. This was gradually extended to include the pathology and treatment of diseased conditions. These courses became so famous that as time went on there came a demand for their production in book form. In answer to this demand, Hajek produced his classic under the title "Pathologie und Therapie der entzündlichen Erkrankungen der Nebenhöhlen der Nase," placing the nasal sinuses for the first time on a solid, anatomical, pathological and clinical foundation.

In all this time he has not had to retrench on one single basic principle then laid down. We challenge criticism of this statement. His book is universally accepted on the continent of Europe as a classic.

Can the same be said of America? We are afraid not. We feel that many rhinologists know the book by name, but have not drunk deeper of the Pierian Spring. And right here we feel lies the real cause for the diverse opinion noted in our opening.

Far be it from us to stifle personal research or originality, but we strongly advise the man who feels that he has discovered something new in relation to the nasal sinuses, to read Hajek's book with its contained bibliographical references, giving opinions from all the leading sinus men of the world, and if he does not find his own idea approved or rejected, then he may feel that he has indeed unearthed something.

In this article we make no attempt to cover the whole ground; we confine ourselves entirely to the region which we believe not to be thoroughly understood by a considerable portion of active rhinologists. If we succeed in interesting these latter, we feel sure they will follow up their interest by acquainting themselves with the whole of Hajek's work.

We present this paper in three divisions: 1. The anatomy of the lateral nasal wall. 2. The development of the ethmoid labyrinth. 3. The significance and diagnosis of pus in the middle meatus.

THE ANATOMY OF THE LATERAL NASAL WALL: The foundation of the lateral nasal wall is laid upon the inner surface of the superior maxilla. In the skeleton the circumference of the large opening in the superior maxilla, known as the hiatus maxillaris, furnishes the articulation to a great extent for those bones which go to make up the wall. We will be more easily brought to an understanding of the apparently complicated structure of this wall if we answer the following question: In what manner is the large opening in a skeletonized superior maxilla closed by the addition of other bones, so that in life only a small opening, the ostium maxillare, is the point of communication between antrum and nasal passage?

The superior maxilla (os maxillare)—its inner surface: The body of the superior maxilla, on its inner surface, presents a large opening which leads into the antrum of Highmore. The circumference of this opening is made up of certain nasal surfaces. Anterior from the body of the superior maxilla and extending upward is the processus nasalis or frontalis. Between this process and the nasal surface of the superior maxilla lies a deep groove, the sulcus naso-lacrimalis, which we will see furnishes the foundation for the ductus naso-lacrimalis. The upper wall of the opening is made by the processus orbitalis of the superior maxilla, the lower by the processus alveolaris, and horizontally and posteriorly it is formed

by the processus palatinus. These processes, then, complete the circumference.

On the inner surface of the superior maxilla run two horizontal ridges: an upper (inconstant), the crista ethmoidalis, the lower, the crista turbinalis, for articulation with the inferior turbinate.

As we have set ourselves the task of answering a certain question with a view to understanding the *ensemble* of the lateral nasal wall, we shall not go into a detailed description of the superior maxilla, as this can readily be found in Hajek's book under a special chapter.

The palate bone (*os palatinum*) *consists of two parts*: 1. The horizontal plate, which articulates with the processus palatinus of

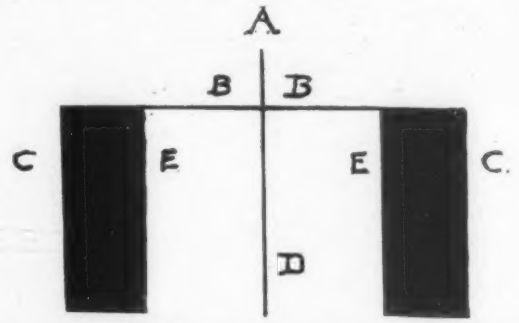

Figure 1 represents the ethmoid bone before resorption. A. Crista Galli. B. Lamina cribriformis. C. Lateral masses of the ethmoid. D. Lamina perpendicularis ethmoidalis. E. Nasal cavities.

the superior maxilla, and (2) the perpendicular plate which articulates with the inner surface of the superior maxilla, resting upon the posterior rim of the hiatus maxillare, and overlapping it considerably. The inner surface of this perpendicular plate also has two ridges: the upper for articulation with the middle turbinate, the lower for the inferior turbinate. This perpendicular plate extends upward into two processes: the anterior or orbital, and the posterior or sphenoidal. A small opening between these two processes, known as the incisura spheno-orbitalis, becomes, by articulation of the sphenoidal bone, the foramen spheno-palatinum. This foramen leads into the fossa pterygo-maxillaris, and through it run the posterior nasal vessels and nerves. We already see how the palate bone begins to close the hole.

The inferior turbinate (*os turbinale*): a lightly rolled bone fastened to the superior maxilla and the palate bone by its upper

edge, its lower edge being free in the nasal passage. The anterior crescentic border articulates with the crista turbinalis of the frontal process of the superior maxilla, while the posterior does likewise with the corresponding crista on the palate bone. The upper edge of the inferior turbinate has a number of processes of which the largest, the processus maxillare, situated about its middle, bends outward and downward, articulating with the lower rim of the hiatus maxillare, helping to close it inferiorly. Its other two processes reach upward. The anterior, processus lacrimalis, a thin, four-cornered bone, bridges over the lower part of the sulcus naso-lacrimalis, and converts this sulcus into the canalis naso-lacrimalis, explaining why this canal empties into the inferior meatus. The canal is completed by the imposition of the lacrimal bone (os lacrimale). Less constant is a posterior process, the processus ethmoidalis reaching to the ethmoid bone. We have now partially closed the hole with the palate and inferior turbinate bone. The rest of it is closed with parts of the ethmoid bone, but before we indicate how, it seems better to first consider the ethmoid bone *in toto*.

The ethmoid bone (*os ethmoidale*): To better understand the structure of this complicated bone, imagine the following: A horizontal sieve-like bone through which the branches of the olfactory nerve come from the anterior fossa of the brain to the nose. This is the lamina cribrosa. Directly in the middle of this horizontal plate is a vertical plate reaching into the anterior fossa, where it is known as the crista galli, reaching below into the nose, where it is the lamina perpendicularis of the ethmoid. From the original horizontal plate imagine a capsule of bone hanging on either side of the perpendicular plate, and we have a fair schematic skeleton of the ethmoid bone.

To definitely fix the position of the ethmoid bone in relation to the nose, draw an imaginary horizontal line from side to side, so that it will touch the inferior border of both middle turbinates. Everything above this line in the nasal cavity belongs to the ethmoid.

The walls of the ethmoid capsule are: (1) The lamina papyracea, a thin, even plate of bone which borders externally on the orbital cavity, above on the pars orbitalis of the frontal bone, and below on and overlapping the orbital process of the superior maxilla.

(2) The median or turbinal wall, and its inner boundary, consists of folds which are nothing else than the turbinate bones. The

lower and larger being the concha ethmoidalis inferior (middle turbinate), and the concha ethmoidalis superior (superior turbinate). In certain cases we have a third—the concha ethmoidalis suprema. Zuckerkandl has seen a fourth. If we look at the skull in sagittal section, we see that from bottom to top each fold or turbinate is shorter, so that in an anterior frontal section we would only have the lower one showing. Between each turbinate and corresponding to it in length is a groove, the fissurae ethmoidalis or meati. Between the median wall and the lamina papyracea lies a space, divided by many septa, known as the ethmoid labyrinth. This we leave for later consideration.

(3) The floor of the ethmoid capsule is made up of a plate of bone convexing downward, and reaching into the middle meatus, known as the bulla ethmoidalis. This bulla is the lowest cell-wall

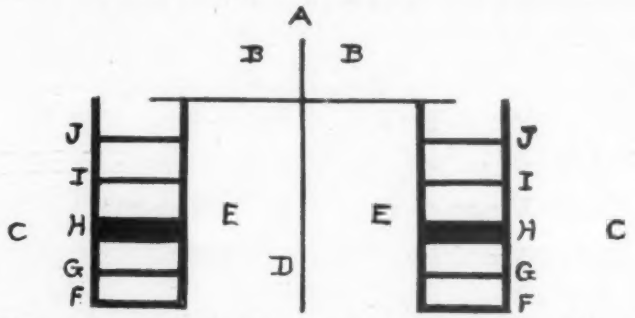

Figure 2 represents the ethmoid capsule undergoing resorption. A. Crista Galli. B. Lamina cribriformis. C. Lateral masses. D. Lamina perpendicularis ethmoidalis. E. Nasal cavities. F. First lamella or stage. G. Second. H. Third. I. Fourth. J. Fifth. Notice the partially opened capsule above, which is closed in by the foveolae ethmoidales.

of ethmoid capsule, and at the same time is the roof and highest lateral part of the middle meatus.

(4) The roof of ethmoid capsule in its median portion is made up of the lamina cribrosa, and in its lateral part by the pars orbitalis of the frontal bone. This happens in the following way: while it is true that in a frontal anterior section, the ethmoid bone appears to be entirely closed in, this closure is only because of its articulation with other bones. A disarticulated ethmoid capsule is actually open above and behind. The cause of this is that the lateral edge of the lamina cribrosa does not reach out far enough to meet the upper edge of the lamina papyracea. This results in a number of open ethmoid cells presenting upward. Let us call them

half-cells. A favorite question in examinations is, what closes the half-cells? The answer is: corresponding cells on the orbital surface of the frontal bone known as the foveolae ethmoidales. An analagous open cell on the posterior surface is often closed in by the body of the sphenoid bone.

Just one more anatomical structure is to be considered before we place the ethmoid in its niche in the lateral nasal wall, namely, the processus uncinatus. This is a small thin process arising from the anterior end of the middle turbinate at its point of articulation with the superior maxilla.

It runs from above anteriorly, backward and downward, parallel and anterior to the bulla ethmoidalis. Its posterior and free end is made up of processes whose number is variable. As a rule, however, there are three processes. One of these articulates with the processus ethmoidalis of the inferior turbinate, another with the perpendicular plate of the palate bone, a third reaches upward to the hiatus maxillare, but may not reach it. With these anatomical facts in mind let us now place the ethmoid bone in its position on the lateral nasal wall.

The lower edge of the lamina papyracea articulates with the orbital plate of the superior maxilla in such a manner that the bulla ethmoidalis slightly closes in the uppermost part of the hiatus maxillare.

The middle turbinate articulates with two bones: anteriorly with the crista ethmoidalis of the superior maxilla, making an elevation known as the agger nasi; posteriorly with the crista ethmoidalis of the perpendicular plate of palate bone.

Between the bulla ethmoidalis and the processus uncinatus remains a slit which communicates with the antrum of Highmore. On account of its shape, it is known as the hiatus semilunaris. Beside this opening there remains the small openings between the aforementioned processes of the processus uncinatus. These openings are all that remain of the large one with which we started (hiatus maxillare). They are further narrowed down by the nasal and antral mucous membranes.

As a rule what actually happens is that the hiatus semilunaris remains open only in its most posterior part—being closed anteriorly by bone bridges and membrane duplications. The same is true of the processes of the processus uncinatus. As a rule it can be said that the only communication between nose and antrum is in the posterior part of the hiatus and this is known as the ostium maxillare. But it is well to remember that the spaces between the

processes of the processus uncinatus may remain open (according to Zuckerkandl one in ten cases) and then we have an extra opening known as the ostium accessorium.

It is clear from this description that in the posterior part of the middle meatus we have a place which is not solid bone, and because of this it has been called the nasal fontanelle and the pars membranacea. This, then, is our conception of the lateral nasal wall, and here we end the first division of our paper.

THE DEVELOPMENT OF THE ETHMOID LABYRINTH: In taking up this subject we wish to emphasize our belief in the absolute necessity of dissecting-room knowledge for the comprehension of this complicated structure. But we wish to be equally emphatic, that the dissecting-room should serve only as a continuation school; it is not the place to begin.

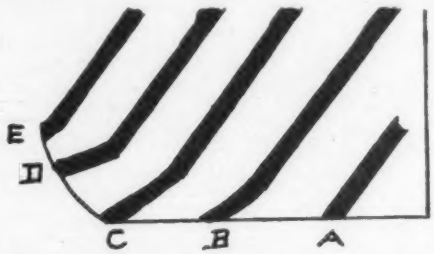

Figure 3 represents Figure 2 seen in saggital section: (a) First lamella or stage. (b) Second. (c) Third. (d) Fourth. (e) Fifth. Always open above.

The key to an understanding of the ethmoid labyrinth is found, not in the cadaver, but in the development, through resorption processes, from the lateral masses of the ethmoid bone, of a series of "Grundlamellen and interturbinalen Gängen. (Seydel, Killian, Hajek, Zuckerkandl). This resorption is not a haphazard affair—on the contrary it proceeds with almost mathematical precision. There are certain exceptions, it is true, but all sound rules have these.

In this paper, then, we shall consider the labyrinth from the standpoint of development, asking the reader to supplement his study on the cadaver and *in vivo*.

Sinus anatomists are agreed that the processes on the medial wall of the ethmoid bone, which reach into the nasal cavity and which are known as turbinates, are nothing more or less than extensions medially of lamellae which cross-sect the whole ethmoid

capsule (lateral mass) extending outward to the lamina papyracea and upward to the lamina cribriformis, and respectively to the foveolae ethmoidales of the frontal bone. We will try to represent this by the following drawings, specifying that the lamellae are what remain after the ethmoid capsule has undergone resorption.

It is clear, then, that a fully developed labyrinth consists of four or five stages or lamellae. The first and lowest, incomplete, makes the processus uncinatus.

The second, complete, makes the bulla ethmoidalis and in typical cases reaches on the one hand the lamina cribrosa on the other the lamina papyracea. If the first stage is compared with the second it is evident that the former is only developed in its lower part and does not cross-sect the labyrinth as does the second.

The second stage, known as the bulla lamella, forms the boundary between the nasal part of the frontal sinus and the ethmoid labyrinth. If it tends to lie somewhat posteriorly the frontal sinus is enlarged at the expense of the labyrinth. If anteriorly, the reverse is true, namely, the frontal sinus suffers and the labyrinth is enlarged. If it lies excessively anterior it may lead to an ethmoid cell being pushed toward the frontal sinus. Such a cell has been given a name (bulla frontalis, Zuckerkandl) to distinguish it from the bulla ethmoidalis.

The third stage forms the middle turbinate and is complete through the labyrinth up and outward. Between the third and second stage lies the anterior ethmoid labyrinth, its size depending on the distance between these two stages. In typical cases all cells lying anterior to the third stage empty into the middle meatus.

The fourth and fifth stages make the superior and supreme turbinates. All cells posterior to the third stage form the posterior labyrinth and empty into the fissura olfacturia. The spaces between the stages or lamellae are known as interturbinate "Gänge" (passages).

This short sketch explains the general architecture of the labyrinth. Anomalies are caused by any particular lamella being out of position, either forward or backward, and also by defects in the lamellae.

The ethmoid cells: These are caused by the development in the interturbinal passages, of septa, complete or incomplete, making sometimes real cells and at others only partial ones.

It can be readily seen that the hiatus semilunaris represents the interturbinal passage between the first and second stages, and is

not fully developed. But in common with the other passages, it tries to develop cells by septal formation, and these latter are apt to be incomplete and when present are known as infundibular cells. Of them, more later.

The number of cells presents the greatest variety. We are not speaking of diseased labyrinths when we say that the anterior and posterior labyrinth can consist of one large cell. Because by anomaly this can be an anatomical fact. On the other hand, the number of cells may be limited only by space. The whole question depends on the position of the lamellae and in the development of septa. In one case the anterior cells predominate, in another the posterior.

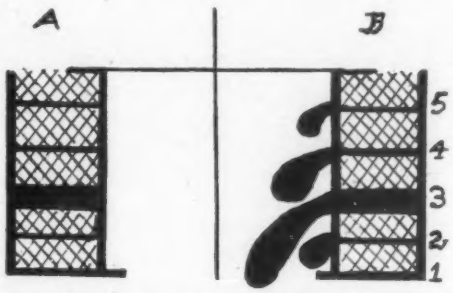

Figure 4 represents (a) the lamellae and interturbinal bony septa which spring up to make the ethmoid cells. (b) The development of the lateral mass completed, showing how, by extension nasally, the various lamellae become. 1. The processus uncinatus. 2. The bulla ethmoidalis. 3. The middle turbinate. 4. The superior turbinate. 5. The supreme turbinate.

For all clinical purposes we speak of the ethmoid cells of the middle meatus as anterior, and the cells of the fissura olfacturia as the posterior cells. This serves all practical purposes. But it must not be forgotten that an anterior ethmoid cell can extend backward to the body of the sphenoid, and that a posterior is sometimes found as far forward as the anterior insertion of the middle turbinate or in it.

THE TOPOGRAPHY OF THE ETHMOID LABYRINTH: It is important that this be understood, because our effectiveness in the diagnosis and therapeutic interference of ethmoid labyrinthitis stands in direct proportion to our knowledge of anatomical conditions.

Let us first take up the anterior ethmoid labyrinth. It borders outward on the lamina papyracea, and upward on the lamina cribrosa, and respectively on the foveolae ethmoidales of the frontal

bone. These boundaries are easily understood. The nasal limits are not so easy. We will consider them under four headings. 1. The anterior boundary towards the frontal sinus. 2. The relation between the anterior ethmoid and the hiatus semilunaris. 3. The extension of the anterior ethmoid cells into the middle turbinate. 4. The infundibular cells.

1. *The anterior boundary of the ethmoid toward the frontal sinus*: We have already stated that the second or bulla lamella forms the boundary between the frontal sinus and the anterior ethmoid. Therefore, anterior to this lamella lies the hiatus semilunaris and the ductus naso-frontalis. Posterior to it lies the ethmoid labyrinth. This is the rule. Now comes the exception, represented by anomalies or defects in the bulla lamella.

The lamella can be placed out of position either backward or forward. In the first case the hiatus semilunaris (infundibulum) is no longer a slit-shaped passage, but becomes a sort of vestibule to the frontal sinus, and bears a striking similarity to an ethmoid cell.

Earlier in this paper we have shown what happens when the lamella lies forward and very far forward. Namely, the frontal sinus is diminished in size before the advance march of the labyrinth, and there may be formed the cell known as the bulla frontalis. We consider this varied position of the bulla lamella as an anomaly.

We have shown that normally a bulla lamella cross-sects the entire labyrinth, externally to the lamina papyracea, above to the lamina cribrosa. But there may be a defect in this defense, partial or complete. Depending on its extent this defect may put any or all of the cells lying between the second or bulla lamella, and the third or middle turbinate lamella, in direct communication with the infundibulum, making in some cases a single large cell of the whole anterior labyrinth.

2. *The relation of the anterior labyrinth to the ductus naso-frontalis*: In typical cases the medial wall of the hiatus semilunaris is covered by, and only by, the solid anterior end of the middle turbinate. But in many cases the anterior labyrinth pushes itself ahead of the bulla lamella and forms the medial wall of the hiatus. In this manner it can come to pass, that the ductus naso-frontalis lies in the middle of anterior ethmoid cells. Also, these cells in combination with the frontal process of the superior maxilla and the lacrimal bone can form a cell known as the cellula lacrimalis, which lies on the orbital side and directly posterior to the sulcus naso-lacrimalis.

The cells covering the medial wall of the hiatus are generally complete but they may be defective, once more causing a single large opening into the hiatus.

3. Extension of the anterior ethmoid cells into the middle turbinate: In certain cases the labyrinth hardly reaches the anterior end of the middle turbinate, but in others it attacks it so severely, that many ethmoid cells are found in its substance, so that the middle turbinate instead of being a solid bone takes on the character of a puff ball.

4. The infundibular cells: We have already shown that the hiatus semilunaris represents an interturbinal passage and as such is liable to cell formation. There are a number of possibilities:

(a) The infundibulum instead of following the usual rule of leading into the frontal sinus can end in an ethmoid cell. In this case, the frontal sinus has a separate opening. This blind cell can remain small or, being larger, pushes forward on the frontal sinus, making a cell called the bulla frontalis.

(b) The infundibulum can have two openings: one leading into the frontal sinus, the other into an ethmoid cell, far forward, which may have varied positions in relation to the frontal sinus. It may be medial, lateral or behind the frontal sinus.

(c) The formation of the agger nasi cell. The cells arising from the infundibulum may develop in such a manner as to actually excavate the processus uncinatus and the agger nasi, the elevation caused by the anterior attachment of the middle turbinate to the crista ethmoidalis of the frontal process of the superior maxilla (Aushöhlung der Agger nasi). In this case the processus uncinatus and agger nasi can bulge prominently into the nasal cavity.
(d) Besides these, there may be a few ethmoid cells opening into any part of the infundibulum.

One last possibility: it has been shown that the foveolae ethmoidales close the labyrinth above. Exceptionally they may not, as the lamina cribrosa may extend laterally far enough to do this. In this case there are no foveolae on the under-surface of the frontal bone, but they are developed below and behind the frontal sinus, and in these cases we may have an actual extension of the ethmoid labyrinth into the frontal sinus.

THE OSTIA OF THE ANTERIOR LABYRINTH: In general, every cell empties into the nasal passage by an ostium of its own or through a cell which is in possession of such. The number of ostia depends upon these circumstances.

The cells can empty into the middle meatus in three places: 1. The most constant location is the angle between the bulla ethmoidalis and the middle turbinate, where there may be one or several openings. 2. Infundibular cells may open backward and laterally into the anterior part of the infundibulum—a fact to be remembered when probing the frontal sinus. 3. The cells can empty into the posterior part of the infundibulum just above the ostium maxillare, explaining under certain circumstances how pus can flow from ethmoid to antrum, making the latter a reservoir.

THE POSTERIOR ETHMOID LABYRINTH: For practical purposes all cells lying behind the lamella of the middle turbinate are posterior ethmoid cells and empty into the fissura olfacturia. This posterior labyrinth is developed from the remaining lamellae, which are subject to considerable variety.

For the rhinologist the posterior ethmoid cell is the important thing. This cell is bounded in front by the lamella of the middle turbinate and behind by the posterior ethmoid wall, which is nothing but the lamella of the supreme turbinate (Zuckerkandl).

This last lamella does not always close the labyrinth. If it lies somewhat anterior, it may divide the posterior ethmoid cell into two halves, of which the posterior is open, in a disarticulated ethmoid bone. This open cell is closed by the anterior wall of the sphenoid bone, and hence is known as the sphenoidal ethmoid cell.

If, now, the lamella of the superior turbinate instead of being vertical, lies horizontal, the cell is again divided into an upper and lower chamber. This upper chamber or cell can push back into the sphenoid body making two cavities in it, of which the lower is the sphenoidal sinus, the upper an ethmoid cell. In this case it is actually an ethmoid cell, whose roof is formed by the wing of the sphenoid, and not the sphenoid sinus itself, which lies next to the brain. The posterior ostia are usually three in number and empty into the fissura olfacturia. A secretion in them would therefore pour anteriorly over the middle turbinate or posteriorly into the choanae.

Here we finish our history of the development of the ethmoid labyrinth. It only remains for us to point out the lesson we learn from it.

Out of the mass of detail we draw this conclusion: The ethmoid labyrinth is made up of two distinct entities—the anterior labyrinth and the posterior labyrinth, each in turn made up of component parts called cells. We should expect to find that any pathological or clinical conditions would have to follow these facts.

From experience we know that they do. Hence we insist on this previous knowledge for intelligent work.

In closing this chapter, we give two examples of what we mean—1. We have shown that under certain conditions, the infundibular cells can entirely cover the ductus naso-frontalis. It is self-evident therefore, that to uncover the latter, these cells must first be removed.

That we have been doing just this for a quarter of a century we would like to show. On page 249 of our book, we give a picture of our instrumentarium, which, among other things, shows the famous Hajek hook, especially designed for this purpose, and the somewhat older bowl curette. Again, on page 251, in the chapter dealing with operations of the ethmoid, we find the following: "Bedenkt man ferner, das der Ductus naso-frontalis auch medialwaerts zuweilen von Siebbeinzellen gedeckt ist, so ist es von vornherein klar, dass bei Freilegung des Ductus naso-frontalis diese mediale Wand aus dem Wege geraeumt werden muss. Man kann nach Entferuung des vorderen Muschelendes mit der Schlinge mittels eines Hakens mehrere Millimeter nach auftwaerts an der medialen Wand des Ductus naso-frontalis liegende enternde Infundibular-zellen (bulla frontalis, agger nasi, etc.) eroeffnen." Now this surgical interference is not the product of accident or revelation, but proceeds directly from our knowledge of anatomical conditions.

2. In like manner we know that the infundibulum is covered medially by the middle turbinate. We know also that there are many openings into the infundibulum, all or one of which may become diseased. For instance, an agger nasi cell, originating from the ethmoid, but for all pathological and clinical purposes a distinct entity, placed anterior to the hiatus and draining backward into it, may be diseased, and the rest of the ethmoid be perfectly healthy. But we can know nothing of the infundibulum while the middle turbinate is in position. What right, then, have we to proceed to surgical interference under these conditions? The spectator in the auditorium can have no idea of the stage-settings until the curtain parts, and likewise the rhinologist must get rid of his curtain, the turbinate, in the infundibular theater.

Finally, we care not how radical we are, provided we can give a reason for it, but we insist that the labyrinth is a whole, divided into halves, each subdivided into parts. We know that the pathology follows these anatomical lines. Treatment, to be rational, must be in sequence. To know that there is pus in the nose is important, but the knowledge is valueless unless we also know its source. If

we tell the fire department that there is a fire on First street, and this street happens to be ten miles long, we have given it little information of value. To better understand the labyrinth and its treatment let us draw a simile. The labyrinth can be likened to a two-family house, each half containing a certain number of rooms, situated in a thickly settled district. Suppuration can be represented by fire.

Case 1: Fire in this house. Apparatus arrives. The first look tells the chief that this building is, or is about to be, a total loss. To him, it ceases to be a dwelling, and becomes a menace to surrounding property. His duty is to the abutters. Treatment must be radical. This will consist in preventing the spread of the flames, controlling them, dynamiting the walls, and eventually razing the building to the ground. This is a destructive operation justified by the end.

Case 2: Similar house. Another fire. Apparatus arriving, chief sees smoke emitting, presupposing fire, but otherwise no external clue to its location. Chief prying off the door (middle turbinate) enters, investigating. Discovers small blaze on the ground floor, first room to the left (bulla). Here the problem is different. His duty is not the public, but to the individual property owner to whom he owes it to extinguish the blaze, with the minimum amount of damage to the rest of the building. He must confine his efforts as far as possible to that one room. He has no legal or moral right to invade the rest of the house, indiscriminately swinging his axe. This is a conservative operation, and the only one justifiable in this case.

This simile finds its analogy in diseases of the labyrinth. It is well known that an ethmoid can be diseased *in toto,* but also that disease can be confined to a single cell, or a number of cells. As a matter of fact, the majority of cases are only partially affected. To claim that these latter should be entirely exenterated would be as unsurgical and illogical, as it would be for a dentist to extract all the teeth, because a few were carious. Yet we see men, who do not believe they have done any ethmoid unless the sides and roof are as smooth as a billiard ball. The whole question of good treatment turns on good diagnosis. In one case radical surgery will be required, in another conservative surgery. First, last, and always, it should be rational surgery.

THE SIGNIFICANCE AND DIAGNOSIS OF PUS IN THE MIDDLE MEATUS: After all that has been written concerning the nasal sinuses, one might safely assume that this question was long since settled. No

assumption could be farther from the truth. The best evidence of this is, that we differ radically from a considerable portion of rhinologists whose names have become identified with sinus work in America. So differing, nothing can be more certain than that we cannot both be right. Our purpose in this paper is to explain our own position, not so much with the idea of defending it, as to use it to point out our objections to others. Our ideas are set forth fully in Hajek's book. We shall only use what seem necessary to us.

We make the broad, general statement to cover all nasal sinus work, that the only certain means of making a diagnosis of suppurating sinusitis is the finding of pus, or evidence of pus (polyp, granulation, hypertrophy, etc.). The x-ray is an excellent means of determining the probable dimensions and anatomic characteristics of the sinuses.

With the finding of pus in the nose, the x-ray and transilluminating apparatus may give excellent corroborative evidence. With a negative finding in the nose, they mean nothing. Alone and unaided, they are worse than useless, as they can and do lead to error.

We have frequently delivered pus from sinuses pronounced negative by high x-ray authorities, and have proved cases negative, which they thought positive.

Given a case of pus in the middle meatus, we insist on following a regular routine, because only in this way can results be checked up.

We first satisfy ourselves that the pus is in the middle meatus. Our next step is to thoroughly clean the meatus, because it must not be forgotten that the pus may be a manifestation of local infection, which has no connection with the sinuses. Having satisfied ourselves on this point, and coming to the conclusion that we are dealing with a sinusitis, we reason that only sinuses of the first series (antrum, frontal and ethmoid) empty into the middle meatus.

Our problem then becomes one of elimination or inclusion. We proceed by first attacking the antrum, for the two following reasons: 1. Because experience teaches that the antrum is more frequently diseased than any sinus of the first series. 2. Because when all other methods of diagnosis fail or are open to question, the antrum puncture always will establish the presence of pus in an antrum.

Consequently, having previously cleaned the meatus, we puncture and wash out the antrum, feeling sure that any pus delivered must come from there and nowhere else. It is inconceivable that pus could flow into the meatus from other sinuses in the short time elapsing between cleansing and puncture.

This is our way. But this immediately brings us into conflict with those who persist in looking at the antrum as a reservoir, and who say: "the antrum is a reservoir for the other sinuses. Clean up your ethmoid and frontal, and your antrum will take care of itself." This we believe to be absolute fallacy, because we not only insist that the antrum is the most frequently diseased of the sinuses of the first series, but we also say that it is diseased *in se*. To avoid misunderstanding we will here say that Hajek was the first to point out that under certain circumstances the antrum could act as a reservoir to the other sinuses. But the exception must not be made the rule.

Let us take up the reservoir-theory of these rhinologists. We believe that the mere pronouncement of this theory spells its defeat, because, believing as they do, these men do not systematically wash out the antrum and hence are left without defense. We do, and feel we have the facts with us. We do not think there is necessity to argue further on this question. But, lest perchance it be argued that this is only a negative body blow, we will try to make it a little more positive.

When we ask these rhinologists for their reasons for believing as they do, they invariably answer that "it is all a question of gravity—the antrum is placed below the ethmoid and frontal, and consequently receives the pus from above."

This is a specious argument until one stops to consider that two very important factors, namely, the anatomy and the pathology, do not lend it their support.

Taking up the anatomy of the ostia we find that the ductus naso-frontalis empties into the anterior part of the infundibulum, whereas the ostium maxillare is found in its most posterior part—in other words, around a corner.

Still more striking is the case of the ethmoid. Here, as a rule, and we must always consider the rule not the exception, the ostia do not empty into the infundibulum at all, but into the middle meatus between the bulla and the middle turbinate. From the anatomy of the parts we cannot see this reservoir theory.

Considering the pathology of sinusitis, in conjunction with the anatomy, we believe the theory gets a complete "knockout." We believe all are agreed that the great majority of sinus cases are caused by germ infection with subsequent inflammation. Under these circumstances, what right have we to assume, that the invading hosts will pass by such a rich prize as the antrum, situated as it is in the outer circle of defenses, to run uphill to tackle the

more fortified secondary line—the ethmoid and frontal? But let us assume that they do, and also that the ostia are so placed that they are in a straight line, one above the other, thus favoring drainage into the lowest sinus.

Consider inflammation with its four cardinal symptoms: redness, heat, swelling, pain. Let us take the frontal sinus as an example, and what we say of it can be applied to the ethmoid. What causes a frontal sinusitis? Inflammation with its cardinal symptoms. But one of these is swelling. As a result, the naso-frontal duct becomes swollen. If it did not, we should have no frontal sinusitis. As a consequence, the invaders become landlocked, so to speak, and the sinus suffers from their ravages. Thus it can readily be seen, that even were the anatomy favorable to the reservoir theory, the very thing which causes a frontal sinusitis, militates against its acting as a pitcher pouring fluid below. When we add to this the fact that the inflammation which closes the frontal sinus very probably closes the ostium maxillare, we see how the antrum protests against being made a reservoir and defends itself by closing the door.

For these reasons we object to this theory. We concede that occasionally, as mentioned in the anatomy, the ostia may be so placed in relation to the ostium maxillare that the antrum can act as a reservoir, but then only when all signs of acute inflammation are absent from the lower infundibulum and a chronic sinusitis persists above.

Finally, we object to the theory because we have, not a few times, washed out of the antrum one to two ounces of pus, in cases which had had a beautiful ethmoid operation and were discharged "cured."

We have devoted this space to the antrum because our daily experience shows us that the number of men differing from us is not inconsiderable.

To return to our own position—we always wash out the antrum; thus ruling it positive or negative, and are certain of one thing i. e., that when we get through with it, it is empty. Transeat.

But the pus may also be coming from the other two sinuses. We make our next point of attack the frontal sinus, stating emphatically that it is more easy of access than the ethmoid, and therefore makes the diagnosis easier. We proceed to probe and wash out the frontal sinus, first having cleansed the middle meatus anew. As a preliminary we resect the anterior end of the middle turbinate for the following reasons: 1. No intelligent knowledge of the infundibulum can be had with it *in situ*. 2. With it out of the way the probing

can be done as a routine procedure. (The fact that there may be a few exceptions, does not make us hesitate to say this.) 3. It is the first step in the surgical treatment of sinusitis, so that we lose nothing by doing it. Frequently good judgment requires that we do nothing more from a surgical standpoint. Having done this, we never have any trouble washing out a frontal sinus. Thus we rule this sinus positive or negative.

By making this statement, we expose ourselves to attack from two quarters: First, we are opposed by the man who holds the turbinates sacred, and who bobs up perennially at medical meetings with his plea to spare the turbinates, on the ground that by excising them one gets an atrophic rhinitis. To this man we answer, that even were he able to prove his point, it would make no difference to us in the face of a greater necessity. If he can prove, that a cutting operation in the nose, directly or indirectly, furnishes the etiology of atrophic rhinitis, he has solved a problem for the medical profession. Why seek farther? On the other hand, we think of a half-dozen reasons which render his position questionable. We give him the first that comes to us. We cite one of the first rules of surgical histo-pathology. "A wound in the nose caused by a cutting instrument is always healed by the regeneration of normal nasal cylindrical epithelium." But this epithelium and atrophic rhinitis are incompatibilities. Ergo.

In this same category and for similar reasons we place that rhinologist who sends his patient to the dentist to have his arch widened, hoping thereby to gain nasal breathing. At the end of nine months the dentist shows this patient that by actual rule he has gained one-sixteenth or one-eighth of an inch. To this rhinologist we say: "Get your patient's teeth fixed if he needs it. But this man comes to you for air, to-day, now—and what do you give him? A nine months' endowment policy on one-sixteenth of an inch! How does he know he is going to live long enough to collect? If he needs air, and the first glance shows you cannot gain anything on the septum, sacrifice a part of the turbinate, sacrifice everything, to gain your end. You would do a tracheotomy if a piece of meat were in his larynx, why should you not be guided by the same principle in the nose?"

We are now prepared to repel the other attack. We have stated that we proceed to probe and wash out the frontal sinus. We mean just that. Immediately there is a storm of protest from the men who say that the frontal sinus cannot be probed in more than half the cases. This, we say, is fallacy pure and simple. Where it

originated we do not know, but we do know that it is widespread and will continue to grow if allowed to pass unchallenged. We know that many rhinologists disagree with us, and we think we understand this. On the other hand, we cannot recall a single sinus anatomist who does not agree with us. What, then, are the facts? In the first place, these men have tried to make a whole truth out of a half-truth.

Jurasz, who first gave birth to the idea of probing the frontal sinus, says "that unfortunately, very often, it is not successful."

Hajek immediately qualifies this by saying, that it is not possible in something over half the cases. We have always been inclined to feel that the fallacy started right here. Our friends saw this statement and got no farther. Now, of course, both Hajek and Jurasz, as well as Hansberg, Choleva, Hartmann, Herzfeld, Winkler and others who have written special articles on the probing of the frontal sinus made these statements in regard to noses in which they attempted to probe by the so-called anatomical route, that is, with everything *in situ*. Given one hundred cases, about forty-seven could be probed without previous preparation of any kind. We see, then, that even now we are only about three points behind what our friends allow as a limit of possibility. Not such a bad batting average, when one considers that this takes in every old kind of a nose! But let us keep on.

We know that the great difficulty to a proper passage of the naso-frontal ducts is the obstruction caused by the middle turbinate, and also by polyps and granulations in the anterior part of the infundibulum. A high deviation of the nasal septum can also cause trouble. Let us assume that all these difficulties have been removed, and then let us see how the case stands. On page 162 of Hajek's book we find that these things being removed, the frontal sinus can be probed, "in jeden Zweifel ausschliessenden Weise ermöglicht werden," in other words, beyond the possibility of a doubt. Literally translated this means one hundred per cent, and the statement is made with full knowledge of the apparent pitfalls offered by the infundibular cells. We do not claim one hundred per cent for the reason that we recognize, that just as there are on the face of the earth people whose hearts are on the right side of the body, so there must be others, whose infundibula are so anomalous as to fall outside the scope of any rule. The objection presented by these few is to us wholly academic, and we have already shown how we should handle them—by uncovering the naso-frontal duct. We wish to make it emphatic that infundibular cells are no contraindication to the successful probing of the sinus.

Another point is, that it is all very well to talk glibly about infundibular cells, but it must be remembered that they are the exception, not the rule, and that in the vast majority of cases the infundibulum leads directly into the frontal sinus. This is our case. Now let us consider, that when a single individual says, that something can be done, and the whole world is arrayed against him, the chances are that he is wrong. But when any considerable number of men are willing to testify that something can be done, the wise man, who is inclined to differ, "holds his horses."

A perfectly fair question is, how do you reconcile the ease in which you speak of probing the frontal sinus with the idea of the opposition? We admit that we have asked ourselves the same question many times, and have answered it by coming to the following conclusions: 1. The average man, who says it cannot be done, has taken some one's word for it. 2. For the last quarter of a century the directions for probing the sinus, both in the rule and in the exception, have been given in Hajek's book. How many of our dissenters are acquainted with them? 3. The average nasal probe and cannula made by American surgical houses bears the same relation, in size and pliability, to the hiatus semilunaris, that a bronchoscope might to the urethra. 4. These difficulties out of the way, the whole argument reminds us of the novice attempting to pass a Eustachian catheter; he bends himself, he bends the patient, but never under any circumstances does it occur to him to bend the tube! He is perfectly willing to admit that John Jones and John Smith may require different sizes in hats and shoes, but he insists that they take the same catheter whether they want to or not.

Having washed out the frontal sinus we now know that the only place pus can come from is the anterior ethmoid. This we now inspect, locating its ostia, probing them, with the idea of finding pus.

Here we finish this article, feeling that we have accomplished that which we set out to do, namely, to explain our position on its three divisions.

We do not claim to have presented anything new—on the contrary, we protest that it is all very old. We do not seek to force you, Mr. Reader, to believe us. We refer you to Hajek's book with its contained references, embracing the opinions of the best sinus men of all times. Are you ready to reject this testimony, to accept the doctrine of those, whose ideas of nasal anatomy and surgery are, at best, things of yesterday?

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THE RELATION OF THE TONSIL TO THYROID DISEASE.*

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The interest of the laryngologist in the manifestations of thyroid disease and the various disturbances of the ductless glands may be active from many lines of scientific investigation.

The literature of the subject is particularly voluminous in the fields of physiology, pathology and medical research, yet comparatively few reports have appeared from our own special realm of study.

It is true that in most communities the internist, the surgeon, the neurologist, and the ophthalmologist diagnose and treat these patients without special or expert examination of the upper respiratory tract. The fault is no doubt ours, that we fail to find symptoms and lesions of sufficient interest to prove our value in the case.

It is a well-known fact that the State of Michigan, for some mysterious reason, is a geographic belt that includes an increased percentage of cases exhibiting disturbances of thyroid secretion.

The phenomena of symptomatology are so varied and extensive that the majority of specialties may classify these cases within their selected sphere, but in my experience the laryngologist is consulted frequently to explain and relieve the early neuroses and various symptoms of thyroid disturbance that are referred to the throat. The onsetting stage of atypical hypo- or hyper-thyroidism is usually overlooked or passed into that graveyard of diagnoses, neurasthenia, indigestion, "a run down condition," or catarrh.

Although our wealth of experimental research has brought out comparatively few physiologic and pathologic facts, yet many of these are sufficiently definite to establish scientific diagnosis and therapy of genuine value.

It is reasonably certain that the thyroid pours into the lymph and blood streams a secretion of the greatest importance to organs and tissues of the upper respiratory tract. It is particularly the function of the thyroid to form a secretion whose physiologic activity is dependent on an iodized protein which is proportionate approximately to its iodin content. To utilize it is not to destroy it but it is reabsorbed by the thyroid in a process of auto-activity.

*Presented at the thirty-sixth annual meeting of the American Laryngological Association, Atlantic City, May 26, 1914.

In the state of insufficient iodin feeding the simple goiter is produced as a compensatory hypertrophy. We are familiar with the increased consumption of oxygen in thyroid or adrenal feeding and the effects upon the heat centers and metabolism. The average amount of iodin in the normal thyroid is estimated at 3 mg per gram of gland substance. It is manifestly obvious that the physiology of the thyroid and other ductless glands is profoundly affected by toxic disturbances in general and particularly by those that enter by the lymphoid ring.

It is especially our function as laryngologists to realize the direct and definite physiologic and pathologic relation of the tonsils to the thyroid and to establish a routine investigation of the effects of tonsillitis, quinsy and other infections of lymphoid tissue upon the upper respiratory tract. My attention was called to this subject by the beneficial results of a series of tonsillectomies for the relief of recurrent tonsillitis and quinsy attended by incipient typical and atypical Graves' disease. The prompt, permanent and prophylactic value of enucleation in this class of cases adds another definite indication to surgical procedure which is given no attention in the literature. As acute and chronic tonsillitis and peritonsillar abscess are recognized as important etiologic factors in incipient exophthalmic goiter, tonsillectomy may be classified then as a prophylactic measure in our new and fashionable department of preventive laryngology.

While it is the purpose of this paper to limit a discussion to the thyroid gland and its relations to the upper respiratory tract a fascinating and scientific field of research is developing in contributions to the inter-relation of the tonsils with the adrenals, pituitary body, thymus and ductless gland system in general.

The diagnostic signs of differentiation according to the degree of hyper- or hypo-thyroidism established have been definitely classified by Beebe and Rogers as follows:

HYPERTHYROIDISM: More common in young women from 18 to 30 years. *Onset* may be slow and gradual or sudden and acute. *Tachycardia,* 128-180; pounding beat felt over a wide area; often a loud systolic murmur over apex, base and along the great vessels. Irregular form, and very susceptible to the effects of exercise. Blood pressure variable, generally low, pulse soft and full, marked dyspnea on slight exertion. Marked edema of legs. *Nervous system.* Fine tremor affecting nearly all the muscles, twitching and occasionally spasms. Patients are abnormally irritable and excitable, apprehensive, mentally very active and physically restless. Muscular

weakness prominent. *Eye signs.* Exophthalmos generally present, although it is not invariable. Occasionally unilateral, corresponding to the side having the enlarged thyroid lobe. Various symptoms arise in consequence of the exophthalmos. No pupillary changes. *Gland.* Enlargement varies from nothing to very large goiter. The blood vessels over the gland are generally much enlarged and pulsate markedly. Right lobe generally the larger. *Nutrition,* severely disturbed; in most cases there is a loss in weight which may progress to extreme emaciation. Appetite variable; vomiting and diarrhea frequent complications. Patients drink a great deal of water. *Skin.* Profuse perspiration; erythema, urticaria, dermographia; pigmentation, which may occasionally be so marked as to suggest Addison's disease. Hair falls out, but is not coarse and dry. Patients prefer thin clothing and cold rooms. They are more comfortable during cold weather. *Temperature* may be only slightly elevated, 99°-100°. In severe acute cases it runs often to 102°-104°. *Urinary findings.* In most cases normal in volume; glycosuria not unusual; polyuria often observed in later stages. Nitrogen proportions show a very much decreased creatinin excretion, while creatin is present in large amounts. Nitrogen is marked during the period of emaciation. *Blood.* Hemoglobin low. Leucopenia in severe cases, with a marked relative lymphocytosis. *Menses* very irregular or completely suppressed.

HYPOTHYROIDISM more common in advancing years from 35 to 50. *Onset* slow and gradual, in many cases engrafted on an old Graves' disease. *Heart,* rarely above 100, may be irregular with heaving impulse. Pulse generally shows high tension and the blood pressure is above normal. *Nervous system.* Patient may have some tremor and muscular weakness is likely to be very pronounced, but there is not the same restlessness and jactitation. Patients are occasionally irritable, but they are generally dull and apathetic; mentally slow; memory defective. Pains in joints frequent, and referred to as rheumatism; there is a marked tendency toward sudden giving way of the legs when walking. *Eye signs.* Exophthalmos is unusual, although it may have been present at one time. *Gland.* Often no enlargement can be made out; when there is a goiter it has an elastic, rubber-like consistance, occasionally cystic and nodular, but very distinctly different from the active pulsating gland of Graves' disease. *Nutrition,* generally not seriously disturbed; patients hold their weight and in most cases gain slowly; constipation rather than diarrhea, and flatulency a troublesome habit. Patients do not drink much water. *Skin,* dry, may be scaly; patients do not

perspire on exertion; hair and nails dry, brittle, and scalp scaly. Pigmentation not common. Patients prefer thick, warm clothing and are cold most of the time. Much more comfortable during hot weather. *Temperature,* subnormal, may reach as low as 95°. *Urinary findings.* Albuminuria is not unusual. Nitrogen proportions do not show so marked a disturbance in creatinin and creatin ratios. In large number of cases urine practically normal. *Blood.* Hemoglobin low, white blood count normal. *Menses* generally regular but scanty.

While the degree of hyperfunction is in no relation necessarily to the size of the thyroid it is interesting to note that the family tendency as brought out in the hereditary story of thyroid, cardiac or nervous disease is frequently of important influence.

The history of infection, shock, fright, overwork, great fatigue, mental strain, worry, or accident, will often mark the onset of an atypical or severe exopthalmic goiter.

As laryngologists, we are ever alert to the influence of systemic disease upon the structures within our chosen fields of observation, yet we are prone in the hurry of routine office work to thrust aside deeper investigation. The unstable vaso-motor nervous system, gout, rheumatism, neurasthenia and auto-intoxication, especially render the subject liable to annoying symptoms in the nose, throat or ears.

Some of these cases may be classified and identified as thyro-parathyroid insufficiency and appropriate treatment given with relief. We recognize marked cases of cretinism, infantalism and exophthalmic goiter or senility for example without difficulty, but the considerable number of atypical forms of disease of the ductless glands with perverted secretions and attending pathologic change and discomfort pass frequently without further investigation.

The effects of thyroid toxemia and deficiency upon the nervous, muscular and cardio-vascular system are so serious that we may find special and early symptoms in the upper respiratory tract.

When the routine examination of the nose, throat and ears includes the cervical, post-cervical glands, thyroid, and thymus, it may be possible to abort an incipient case of Graves' disease or of pulmonary tuberculosis. These conditions are frequently associated with low resistance to infection.

Our observation may include the size of the hypertrophy, consistence, shape, one or both lobes, diameter of the neck, pulsation, or bruit. We may verify our suspicions before referring the case

to the internist for diagnosis. The pulse will be observed as to rate, quality, arterial tension and effect of exercise. The nervous symptoms especially are those of tremor, twitching, jactitation, insomnia, dreams or disturbed mental condition. We may also find dry or moist skin, dry, dead or falling hair, brittle nails, pigmentation, eruptions, dermographia, dyspnea, fatigue, nausea, temperature.

Again we may return to the symptoms and signs in detail as observed in our special field.

In moderate or severe thyroid insufficiency we may find a dry mouth and throat increased with excessive dyspnea on exertion; voice, husky or thick; muscles of throat tire more easily; defects or changes in speech. The mucous membrane of the lips, mouth, tongue, pharynx or larynx may be swollen and dry. The laryngeal muscles may show insufficiency.

Matthews has reported 289 cases of laryngeal paralysis in one thousand cases of goiter, seventeen of which were bilateral. In my experience, a number of cases have exhibited slight motor insufficiency according to the size of the goiter and the varying degrees of pressure. It would seem to me that as many of these cases have passing insufficiency it is scarcely tenable to term this condition laryngeal paralysis. It is quite remarkable that a change in voice is not necessarily in proportion to the degree of insufficiency.

Perversion of taste may occur. Howard observed six with abnormal taste in a series of thirty-two cases. Hume and Prudden report as high as one-third abnormal after a careful testing of the sense of taste. These occur usually in hypo-thyroidism.

In Graves' disease, taste, smell and hearing are rarely affected. In severe deficiency of thyroid secretion, hemorrhages from the nose, throat or gums are common. The amount of dyspnea may simulate cardiac or pulmonary disease of severe type. This modification of the oxygen supply due to the adrenal insufficiency may bring about a marked effect upon the hair, nails and skin.

Dyspnea in hyper-thyroidism occurs after damage to the heart muscle has occurred. In myxedema, we occasionally observe an infiltration of the nasal mucous membrane followed by thickening and occasional obstruction by a gelatinous, waxy or yellowish secretion. This may be attended by symptoms of a cramped and swollen feeling in the throat. Pharynx and larynx may assume a bluish tinge or earlier a pale, yellowish color. Angio-neurotic phenomena occur with relaxed or elongated conditions of the uvula. The interarytenoid fold may be transparent.

The dry and husky throat of Graves' disease may be attended by symptoms of cough, temperature, unilateral bruit, loss of weight, pre-cordial pain, apprehension, and anemia which may lead to a suspicion of mistaken diagnosis of pulmonary tuberculosis, and call in proper differentiation. In Graves' disease, hyperemia of the pharyngeal, bronchial and pulmonary mucosa is common.

The thyroid gland under hyper-function is often hard, and in this condition gives rise to greater pressure, which is frequently the exciting cause of tracheal cough. This may be modified by change of position and improve with a softer consistency of the gland. Some of these cases exhibited periodicity in their intervals of exacerbation and quiescence.

The abnormal psychic condition of the individual upon his discovery of an enlarged thyroid gland immediately assumes a serious phase of apprehension unless he is managed with great care and foresight.

As apprehension is one of the predominating symptoms it is often possible, without very great care, to alarm these individuals and produce a serious hypochondriacal condition.

In considering the therapy of thyroid disease in general, it is understood that the great majority of drugs are entirely useless except when occasionally indicated for the control of special symptoms. An enormous number of therapeutic measures have received the endorsemnt of many splendid physicians. It is, therefore, a question of serious consideration to know what we can do for these patients that offers something of value.

The therapeutic measures which we adopt at the present time are those selected by elimination after a study of these individuals for many years. Rest and often a change of environment are absolutely essential to the ultimate control of thyroid disease. Psychic control and management together with sedative therapeutic suggestion is of untold value. The question of success in the treatment and recovery of incipient exophthalmic goiter will frequently depend upon these two essentials.

In myxedema and particularly in the atypical forms, great relief and permanent improvement is usually attained by a careful plan of administration of thyroid extract and iodin in carefully selected dosage of carefully selected preparations. The action of the thyroid protein is specific and within the realm of prompt observation. The secretions of the myxedematous throat and nasal passages become greatly improved, and the combination of the thyroid proteids of Rogers, the proteids of pancreas or adrenals and iodin will

frequently bring about striking improvement. Proper use of the galvanic cautery—the anode electrode applied along the cervical, sympathetic and the cathode applied to the neck, with a one miliampere current gradually increased—is often attended by an improvement in the consistency and size of the thyroid.

Operative interference, either ligation or enucleation, should not be postponed in cases where medical treatment does not show improvement after a reasonable time. The results depend greatly upon the skill of the surgeon, as a number of serious results may testify. The use of hypodermic iodin or the green citrate of iron is often of great service in rendering the vaso-motor system more stable. Many cases of the myxedematous type improve greatly under the administration of pure iodin. The study of the individual cases alone can definitely determine this problem.

The internal secretions and their relations to pathogenesis, physiology, and therapeutics deserve our most serious study. The role which they assume as oxygen carriers and active principles of stimulation to the blood cells of the body deserve our interest. Their role as immunizing and sensatizing functions is worthy of increased scientific interest. Their influence as governors over the vasomotor centers and regulators of harmony in the functions of the lymphoid tissue of the throat is indeed significant.

We are unable as specialists to unravel many of these great mysteries of bio-chemistry. We must call upon our laboratory colleagues with the spirit of research and untiring devotion to scientific investigation to solve these problems for us. Individually we can offer only our clinical mite. Yet it would seem that the laryngologist and otologist has sufficient interest in the newer fields of organo-therapy and pathology of the ductless glands to demonstrate that the thyroid and the tonsillar ring are involved in such a delicate and complex inter-relationship that our special opinion in this field of research may, we hope, soon prove sufficient to call the attention of the internist, the neurologist, and the general surgeon to the fact that an examination of the nose, throat, ears and larynx is at least in all modesty worth the effort.

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SUSPENSION LARYNGOSCOPY IN CHILDREN.*

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Since the discovery of the laryngoscope by Garcia no more interesting chapter in the history of laryngology has been written than the most recent one by Killian[1-2] in which he describes the discovery of suspension laryngoscopy. The original conception of a method by which a more definite, comprehensive and a closer view of the interior of the larynx might be obtained was an epoch-making thought and when after many trials on the cadaver extending over a period of two years, and many alterations in instruments he was finally rewarded with a picture of the larynx and surrounding parts, the like of which had never been obtained before, one can imagine his sense of pleasure. In addition to this, when the operator realized that the patient comfortably submitted to prolonged examinations, that he did not need the aid of assistants, and that both of his hands were free for any desired manipulation, his sensation must have been akin to exaltation.

Since Killian's original communication suspension laryngoscopy has been elaborated, its limitations and advantages having been carefully proved and commented upon. It has generally been conceded that in adults its limitations are greater than in children and in a personal communication from a former student now in Berlin, suspension does not seem to be used as much as it was. In children, however, all observers early recognized its value even before it had been tried out in many cases.

The difficulties attending the use of the laryngoscope in young children have often been so great that frequently no satisfactory examination could be obtained. These difficulties became increased when an attempt was made to perform any intra-laryngeal operation, so that in very young children, especially, it was practically impossible to perform any manipulation *per vias naturales*.

Direct laryngoscopy and tracheoscopy offered a solution to this difficult problem that was enthusiastically adopted by the profession. There are, however, many advantages in the suspension method over that of the ordinary direct endoscopy. By the latter method one obtains but a limited view while by suspension the entire field and surrounding parts are clearly before one. In operations both hands are free so that one may with ease perform an operation in

*Read at the twentieth annual meeting of the American Laryngological, Rhinological and Otological Society, Atlantic City, June 20, 1914.

this region, keeping the parts free from blood and secretion without difficulty. During suspension, the danger from asphyxia may be said to be *nil* while we all know that in the direct method, especially if the trachea is entered, this complication is one which must be reckoned with. Besides the advantages enumerated it is remarkable how clear a view may be obtained of the anterior commissure of the larynx and of the trachea. This statement applies particularly to children. In adults the most difficult region to bring into view has been the anterior commissure and although numerous modifications of Killian's original apparatus have been presented, it is believed that this difficulty represents an important limitation to the method.

The after-effects of the suspension method of examination are of no more serious moment than those of the most simply laryngeal manipulation, while in the ordinary direct method, annoying, not to say serious, swelling and edema have resulted in children.

The technic of this procedure in children differs but slightly from that in adults. It may be said to be somewhat easier, although in no event can this procedure be considered a difficult one. It is not necessary to draw the tongue forward, nor, in fact, to pay attention to the tongue. It is not necessary that the head hang far over the table; in fact, if a pillow be placed under the shoulders the head may even rest upon the table. In many instances, especially when examining or operating in the esophagus, the spatula need not be brought over the epiglottis, but resting well at the base of the tongue it will bring the parts into perfect view. Somewhat more difficulty has been encountered in tracheotomized cases than in non-tracheotomized ones. The secretions and blood flow by gravity away from the field of operation but sponging may be easily carried out and if necessary the parts may be kept clean by gentle suction, using a small electric suction pump.

The question of anesthesia in children is an important one. As a rule local anesthesia is not entirely satisfactory. The child's co-operation can not always be obtained even though one succeeds in anesthetizing the parts. Often, in order to obtain sufficient anesthesia to permit any extended investigation, cocain must be used in considerable quantity which is conceded to be attended with decided danger in children. I have attempted a number of examinations in young children without any anesthesia whatever. In one instance, a baby about a year old was satisfactorily examined and a papilloma successfully removed from the larynx. It was afterwards shown, however, that other papillomatous growths had been

overlooked. On the whole, general anesthesia, preferably chloroform, has given me the best results. The Junker apparatus and tube add very much to the comfort and facility with which the anesthesia may be continued. Most of us will concede that chloroform is somewhat more dangerous than ether but the excessive secretion produced by the latter is a disadvantage, although not sufficiently great to condemn its use by those who are unalterably opposed to chloroform.

The specific uses to which suspension laryngoscopy has been applied have been numerous, despite the fact that it has been in use so short a time. It has been used (1) in the examination of cases for diagnosis; (2) for operations through the natural passages; (3) for the removal of foreign bodies.

In making an examination of the upper air passages the hypopharynx has frequently been overlooked. This method brings it into view better than any other means at our command. All portions of the larynx and some of the trachea are clearly seen, being brought closer to the observer's eye than by other methods. The field brought into view is not limited and the relations of surrounding parts are definitely established. The esophageal opening is easily outlined, enabling one to manipulate the upper part of this tube with ease. Operations in the pharynx, hypo-pharynx, larynx, trachea, upper part, and beginning of the esophagus may be carried out with ease and deliberation. Foreign bodies, especially impacted ones and those requiring some manipulation for their delivery, are more readily removed because of the advantage given by the free use of both hands. The following is a brief summary of the recorded uses to which suspension in children has been put:

Albrecht[4] reports the following: Eight cases of papilloma in children from 4 to 9 years of age in all of which these growths were successfully and completely removed. Two cases of tuberculosis of the larynx of which the first was a child, 13 years of age. There was dyspnea due to infiltration of the ventricular bands with edema and granulations of the vocal bands. Relief was obtained by the removal of the infiltration and granulations. The second was a child, 9 years of age, with stridor from infiltrated ventricular bands with ulceration; relief by removal of the infiltration. Three tonsillectomies in children aged 4, 7 and 8 years, respectively.

Henrich[5] reports the case of a child 3½ years of age, with papillomata of both arytenoids, in the subglottic region, in the hypopharynx and in the esophageal entrance, successfully operated upon.

Davis[6] speaks of the examination of an infant, 4 months old, suffering from laryngeal stridor. The cause was not determined.

In a child, 3 years of age, said to be suffering from laryngeal or tracheal obstruction, suspension was unsuccessful. Bronchoscopy succeeded but failed to reveal the cause of the dyspnea. Davis[7] also removed a safety-pin from the larynx of a child, 11 months old, and a coin from a child, 4 years old, that had lodged in the esophagus.

Seifert[8] reports the case of a child, 3 years of age, from whose esophagus a coin was delivered. A child, 2 years of age, suffering from papilloma was saved from tracheotomy by direct curettement. In a child, 5 years of age, he removed a bone from the larynx. Seifert recommends this method for the removal of vocal nodules in children, for the excision of a portion of tumors for histological examinations, for the removal of sub-glottic granulations and for the diagnosis of laryngeal diphtheria.

Freudenthal[9] reports two most interesting cases of post-pharyngeal abscess in children, 16 and 19 months old, successfully operated upon. He also speaks of its uses in tonsillectomy, having performed this operation under suspension in twenty children.

Iglauer[10] reports the case of a child, 3 years old, successfully operated upon for papillomata of the larynx; also that of a child. 5 years of age, from whose larynx he removed a broken safety-pin that had been there five months. Three cases of enucleation of the tonsils were undertaken by him. He states that he could see no special advantage in this procedure over the ordinary method.

I desire to report briefly the following cases. *Case 1.* W. L., aged 12. Moderate tuberculosis of the pharynx, extensive tuberculosis of the larynx with ulcerations and edema. This little patient suffered from slight dyspnea which gradually became worse until tracheotomy was necessary. Following the tracheotomy the patient's condition rapidly improved with ultimate healing of all ulcerations but marked cicatricial formation. This was before the days of suspension laryngoscopy. Four years after the tracheotomy, under suspension various attempts were made to remove the cicatricial tissue and dilate the stenosed larynx. The result was only partially successful and the patient is now being treated by gradual dilation with Schroetter's tubes.

Case 2: A. C., aged 2 years and seven months. At the age of 9 months the child drank some corrosive liquid, since which time she has been able to swallow only liquids. For the past nine days she has been able to take liquids only by spoonfuls. Parents suspect foreign body. X-ray examination with bismuth in ice-cream showed a small line in the upper extremity of the esophagus but it

was not recognized as indicating a foreign body. Bismuth was found in the stomach. Diagnosis, stricture. Under suspension the esophageal entrance was readily explored. Esophagoscope failed to enter. Small bougie after some manipulation passed into the stomach. Larger bougie, three millimeters in diameter, also successfully passed. Following the manipulation, the anesthesia having been discontinued, retching and vomiting took place, expelling a plum seed.

Case 3: This case occurred in the practice of Dr. Lockard of Denver through whose courtesy I am permitted to report it here. A girl, aged 26 months, drank strong solution of lye about six weeks prior to coming under observation. For forty-eight hours previous to the first examination she was unable to swallow anything. Under general anesthesia suspension laryngoscopy brought the mouth of the esophagus into plain view. It was impossible to introduce the smallest Jackson esophagoscope. A small probe followed by an olive bougie, three millimeters in diameter, was finally passed, locating the stricture at seven and eight inches, respectively, from the teeth. Four hours later she was able to swallow liquids. As it was impossible to pass an esophagoscope the suspension laryngoscope was an indispensable instrument, enabling one to find and safely pass the very small opening.

Case 4: M. C., aged 2½ years. Hoarseness for five months. On direct laryngoscopy under chloroform anesthesia, multiple papillomata were found springing from the vocal bands and from the base of the epiglottis. An attempt to remove these was made, resulting in sudden asphyxia which demanded immediate tracheotomy and artificial respiration. Three months later papillomata were removed under suspension by means of Corde's straight-cutting forceps or double curette. Five subsequent operations have been performed. At various times in spite of the tracheotomy tube alarming dyspnea has occurred. Suspension laryngoscopy revealed at these times sub-glottic and tracheal papillomata which were successfully removed. Recurrence has taken place from time to time and although the voice has been partially restored, the child still wears the tracheotomy tube.

Case 5: D. P., aged 8 months; hoarseness since age of 5 months. At birth child gagged and was blue for one-half hour. Has always cried but little. At present aphonia is nearly complete. Under suspension and general anesthesia multiple papillomata were removed from the anterior commissure. Voice restored. Four subsequent operations under general anesthesia and one with no anesthesia whatever have kept the larynx fairly free. Prior to the last

operation slight stridor in breathing was noticeable. Following this operation the voice returned, though husky in character, and the difficult breathing was completely relieved. Papillomata were found supra-glottic and infra-glottic.

I have been unable to find records of papillomata removed by suspension in a child of this age, although Jackson reports, in a personal communication, the case of an infant, 6 hours old, from whose larynx he removed a papilloma by direct laryngoscopy.

Case 6: A. G., aged 10 years. Hoarseness with a history of having inspired two days ago an immature wild oat or wheat head. Indirect laryngoscopy was readily carried out and revealed a green mass in the anterior commissure. Although the child was unusually tractable it was impossible to remove the foreign body by the laryngoscopic mirror and forceps. Under suspension and chloroform anesthesia, removal was accomplished with the greatest facility.

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ROUTINE USE OF THE BRONCHOSCOPE IN THE OUT-PATIENT DEPARTMENT.*

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Since the time of Kirstein's embryonic attempts, failures and successes, bronchoscopy has wavered, suffered relapses, regained lost ground, and is now coming to the front to its own and recognized place in diagnostic and therapeutic laryngology. Unfortunately, the proper manipulation and technic of bronchoscopic examination is hard to master and requires time, patience and constance practice and we are reminded more and more of the words which the father of bronchoscopy in America, Dr. Jackson of Pittsburgh, used in his paper, read before the International Convention of Medicine in London last year, "That this is a specialty of a specialty and should only be practiced by one or two men in a large city." This is unquestionably true as far as the extraction of foreign bodies is concerned, but a more universal use of the bronchoscope for diagnostic and therapeutic purposes I think might be advantageously employed. You will notice a deviation from practically all former technic in the passing of the instrument on the cases we will examine to-night, and I hope the few points I present may be of benefit to all.

A general or local anesthesia is essential; although examinations have been repeatedly successfully made without either. A low stool standing fifteen to eighteen inches from the floor, preferably having a concave back to give the patient a slight forward tilt, is necessary for examining all cases under local anesthesia. Confidence in yourself and instilled into your patient by your every gesture and movement is one of the main points, and counts tremendously in your successful examination. From the time of your first application of the anesthetic until the tube has been withdrawn nothing must excite the patient's ever-ready susceptible mental anxiety and cause reflex movements.

As we have all kinds and types of patients,—the neurotically nervous, the hysterically hypersensitive,—so we have the inquisitive, the sensible and the boozy-breath variety, but if there is really a condition which has been defying the ordinary therapeutic meas-

*Read at the meeting of the Philadelphia Laryngological Society, October 6th, 1914.

ures and has finally become a question of "I want to know what is wrong" with the patient, you will have very little difficulty in getting your examination.

Anesthetising. With the patient sitting in the regular position for an ordinary examination, the applicator saturated with a 20 per cent cocain solution is applied to the tonsillar pillars, tonsils, pharyngeal wall and base of tongue. This is done quickly or slowly according to the sensitiveness of the patient, but can almost always be accomplished in one application; it, however, must be most thorough. A small amount of solution of adrenalin added to the cocain will bring about a quicker anesthesia of the membrane but for the initial examination is not advisable because of its bleaching qualities, thereby possibly masking the very condition we are looking for.

The patient is now asked to expectorate any mucus in the throat. This to a great extent prevents the swallowing and absorption of any excess of cocain solution which had been applied.

After waiting three to five minutes the second application of the anesthesia is made by means of the laryngeal applicator, a von Eicken's laryngeal retractor or a Bunting's laryngeal syringe. The same strength, viz: 20 per cent solution of cocain is used. The patient is given a small pad of gauze and told to extrude the tongue and hold it. Do not allow your patient to pull forcibly on the tongue; this causes considerable uneasiness, gagging, reflex movements and excoriations of the under-surface of the tongue due to pressure on the teeth.

With the aid of a heated laryngeal mirror, the applicator is now passed over the edge of the epiglottis and the laryngeal surface painted. The applicator is now depressed, thereby coming in contact with the arytenoids, the aryepiglotteal folds and cords. These are thoroughly coated and the applicator is allowed to remain in this position for a minute or two. The patient is again requested to spit out any secretion in the mouth.

It will be noticed that this is done by one application, instead of irritating your patient by repeated dabs here and there, each requiring opening of the mouth, correspondingly more saliva, cough and expectoration. It is surprising what a slight amount of gagging or reflex coughing is produced by the cocain-coated cotton applicator when brought into absolute contact and a slight pressure exerted instead of a quick passing over the tissues with the ordinary painting motion. Occasionally we meet with a patient who cannot put out his tongue. It is therefore impossible to catch hold

of it; so it must accordingly be depressed with a tongue depressor. If we meet with a very marked overhanging epiglottis it can generally be overcome by asking the patient to sing a high pitch "E" or to inspire, in a panting fashion of sharp, quick inhalations.

If a direct examination of the larynx, cords or hypo-pharynx is wished, the tissues are now sufficiently anesthetized to permit it. If, however, we intend to pass the bronchoscope, a third application of cocain is necessary and may be done by either of the following methods:

The Skillern method: We use a long tracheal applicator, the distal end of which is bent at a slight angle for three inches in order to glide in front of the arytenoids. It has a cork screw or rat tooth-end, in which the cotton applicator impregnated with 10 per cent cocain solution is held. The patient again holds the extruded tongue and by the help of a laryngeal mirror the applicator is passed into the larynx and lies on top of the cords. A slight spasmodic contraction of the ventricular bands is very likely to occur, preventing further progress until a relaxation takes place which occurs in a minute or so. The patient lets go the tongue and bends the head back, thereby bringing the trachea and larynx in a more direct line. He is asked to take a deep inhalation, thus widening the glottic opening, when with a gentle pressure the applicator slips into the glottis and trachea to the bifurcation.

The Killian or Bruening method: After the upper larynx has been anesthetized the spatula autoscope is passed behind the epiglottis and the epiglottis brought forward, bringing into view the arytenoids and cords.

A long, tracheal applicator similar to the one employed in the Skillern method, only straight, is used, on which is the cotton applicator with a 10 per cent solution of cocain. The anesthesia is passed through the autoscope, through the glottis, and applied to the walls of the trachea as far as the bifurcation, or may even enter the bronchi. I shall speak later of anesthetising the lower bronchi. Our patient is now ready for a bronchoscopic examination.

Technic:—The clothing is loosened around the neck, the collar taken off, if the patient be a man, any plate teeth removed and the patient placed on the low stool. They are now told what is expected of them and what we are attempting to do. They are also told that if at any time during the passing, or while the instrument is in position, they wish it removed to raise the right hand and

you will comply with their request immediately. You will find, particularly on a new patient, this will occur and you retain their confidence by the instant withdrawal of the tube.

The mirror and bronchoscopic tube are heated to prevent condensation of breath on its surface, and to bring the metallic tube nearer to the body temperature; the outside of the bronchoscope is lubricated with sterilized olive oil, vaseline or other lubricant; the patient's knees are placed between the operator's, who stands directly in front. The left forefinger is placed under the upper lip of the patient and pushed up; thus preventing abrasion, lifting the mustache out of vision, and also acting as a guide. The thumb may either support the finger or else rest on the lower teeth. The patient's head is now bent slightly backwards and the instrument is inserted into the mouth, passed back to the base of the tongue and the handle slightly elevated, thus allowing the distal end to slide over the base of the tongue until we see the lingual surface of the epiglottis. The index-finger of the left hand now leaves the upper lip and half-circles the tube about the center of its position along the dorsum of the tongue. We now have the tube on the lingual surface of the epiglottis where it is held in place by the hooked finger, which not only steadies it but also brings pressure on the tongue and stops quivering or nervous twitchings of its muscle fibers.

The distal end of the bronchoscope is now raised over the rim of the epiglottis and is allowed to descend about one-half inch when by a slight forward pressure with the finger the glottis is brought into view. We now place our patient in a position which will give us a direct or straight view of the trachea and with gentle pressure bring the instrument to the glottic opening, or vocal membranes. The movements and tissues must be kept in constant view and everything done in plain sight, as the least movement of the epiglottis will throw the instrument over to its lingual side and the instumentation must be done over. Although the cords have been thoroughly cocainized we frequently find a spasmodic contraction and a pause of a few seconds will be necessary. Having your patient say "ah," or take a deep inhalation will frequently open the glottis, which would otherwise give considerable trouble in passing. A half turn brings the lip of the tube in a direct line of one of the cords and a gentle rotation with a downward pressure will be all that is necessary for the instrument to enter the trachea, when the handle is once more turned in a direct line and the scope allowed to slide down to the bifurcation.

The anesthetising of the main and branch bronchi may be done by a single application of 10 per cent cocain solution applied to the walls or used in a long atomizer. The inside or telescopic tube can now be inserted and the examination done at the operator's option. In passing all of the tubes whether on the right or left side we bend our patient's body until the line of the bronchial lumen is straight, then advance until another angle presents itself, when the position of the patient is again changed to suit our view and the downward progress of the tube.

While it is not the fort of this paper to go into all the diagnosis and treatment that may be made and instituted by bronchoscopic means, nevertheless it is within its limits to speak of some of the many conditions which have fallen to the author's fortune to diagnose and treat in the out-patient department of the Medico-Chirurgical Hospital.

Tracheitis or tracheal bronchitis appears through the bronchoscope as highly inflamed or mucous-covered areas of mucosa, these extending around the whole lumen of the bronchi, or as patches along its walls, varying in size from a large pin's head to those of one-half to an inch in length; or we may find a dry condition, the secretion having formed hard crusts or scales of a dark or greenish hue and it is due to the almost inaccessible position, from a mechanical, anatomical and physiological standpoint, that this condition is so hard to cure by ordinary methods. Knowing the condition and seeing the inflammed areas the therapeutics naturally suggest themselves and we therefore apply to the diseased mucosa, after cleaning off all secretions, silver nitrate, glycero-tannin, the touching of the dry areas with an application of a 10 per cent alcoholic solution of iodin or any other measures that are indicated.

Ulcerations and abrasions of the tracheal or bronchial mucosa are treated as any other ulceration or abrasion of the mucous membrane elsewhere in the body would be treated, for by use of the bronchoscope we are able to do this and the only difference is one of location and not treatment.

Catarrhal hypertrophies of the mucosa appear as swollen, inflamed, spongy areas extending into the lumen of the trachea or bronchi and lessening its diameter. The secretion is usually found to be very tenacious and hard to remove. The treatment varies with the condition present, from the use of glycero-tannin, a 2 per cent solution of silver nitrate to the application to the swollen areas of chromic acid, fused as a bead, to an applicator.

Bronchial or spasmotic asthma: It is utterly surprising to realize the number of cases of spasmotic asthma which have their origin and continuance in a local lesion in the bronchial tree, and when this is removed are permanently cured. I recall one in which the attack of asthma and its accompanying dyspnea and cough was due to quite a large papilloma situated on the carina, the removal of which gave immediate and permanent relief. Others, if having no growth, showed a hyperemia or hypertrophy of the mucosa with tremendous amount of fetid secretion. A mixture sprayed into the lower bronchi of 2 per cent novocain, 1-10,000 adrenalin gave excellent results, curing some, prolonging the interval, and diminishing the severity with lessened amount of expectoration in all.

Obscure hemorrhage: Bleeding from any of the arteriols of the mucosa is easily seen, and by the application of silver nitrate or chromic acid controlled.

Stricture or stenosis of the trachea or bronchi: A stenosis of the trachea or bronchi as we can readily understand is a rather difficult problem. We have here an elastic membrane which can easily be dilated; but when the pressure or dilator is removed, will assume its old shape quickly; but if these dilatations are kept up sufficiently long and frequently enough, the result is all we could expect. There are several dilators, bougies and stenosis tubes which can be applied and left in the stricture for hours at a time.

Compression of the trachea with its accompanying dyspnea, due to mediastinal tumors, goiter, aneurysm, or enlarged glands may be diagnosed and possibly relieved or the diagnosis cleared by bronchoscopy, thereby facilitating the medical or surgical treatment. Syphilitic ulcerations of the mucosa are easily distinguished and the proper treatment instituted, sooner than would otherwise be possible. Obscure dyspnea is frequently found to be caused by an overabundance of fluid or mucus in the lower bronchi and with the vacuum attachment pumped out, relieving our patient who would otherwise become progressively worse.

2032 Chestnut Street.

ERRATUM: Paragraph 6, page 897, THE LARYNGOSCOPE, October, 1914, should read: "Given bilateral deafness with marked lowering of the upper notes, a positive Rinne with low bone-conduction and normal low limits for the Dench fork the cause is usually syphilis."

THE ENVIRONMENTAL SURGERY OF OTO-LARYNGOLOGY.*

DR. JOHN F. BARNHILL, Indianapolis.

In Beverly Robinson's work on "Nasal Catarrh," issued in 1880, he states in the introductory chapter: "I can believe but few amongst the most favored have seen and treated more than one case, here and there, of suppuration of the frontal sinus, or rare tumor of the brain."

He makes mere mention, only, of the fact that suppuration may occur in the maxillary or sphenoid sinus, but no intimation whatever is given that suppuration or other diseases of the ethmoidal cells ever takes place. The treatment of nasal disease advocated in this book consisted chiefly in the use of nasal douches, powders and general medication, but a brief description is given of procedures for removing polypi, cauterizing thickened nasal tissues, or for tearing the same away when too much thickened to yield to milder measures.

In the same year Buck issued a splendid treatise on the ear, abounding in excellent descriptions of the symptoms and course of aural affections. The chief operative measures advocated by him in this work are the removal of polypi, incision of the drumhead, and the cautious opening of the mastoid antrum by means of a bone drill. In neither of these representative texts of one-third of a century ago is there more than the slightest reference to intra-cranial complication as a result of suppuration in the nose or ear. There is, of course, no bacteriologic teaching, and there are no references to involvement of the venous sinuses, to orbital complications, to transference of infected materials to the cervical lymph nodes, to the infective and pressure disturbances of the fifth nerve and its ganglia, or to any of the many other diseases of the head and neck which are to-day known to originate in the upper air tract with great frequency. The practice of oto-laryngology in those days was indeed simple and was therefore more easily limited to very definite anatomical fields than is to-day at all advisable. Hence opinion as to what constitutes the proper surgical limitations of the oto-laryngologist of to-day is vastly different from that held in the early period of the specialty. At that time the view seems to have been that the nostrils formed chiefly the anatomical limits of the nose, the

*Read at the thirty-sixth annual meeting of the American Laryngological Association, Atlantic City, May 25, 1914.

tympanic cavity and Eustachian tube were considered the principle structures of the ear, and the opinion of specialists of that day must have been that there was little outside the oro-pharynx and larynx, the diseases or treatment of which should interest or belong to the specialist in laryngology.

Comparatively little was written in those days concerning the diseases or surgery of the accessory cavities or of the other intimately related environmental structures of the nose, throat and ear, which neighboring structures we now regard, in a large number of instances at least, as of more importance, judged from a pathological and surgical standpoint, than are the nostrils, tympanum and larynx themselves. Since later investigations have proved that nasal diseases are not often limited to the nostrils, aural diseases to the tympanic cavity or laryngeal affections to the larynx, and since their environment—the meninges, the ganglionic structures, the arterial, venous and lymph vessels, the lymphatic glandular system, and, in brief, practically all the structures of the head and neck—are often more the seat of disease than are the classical but vastly more simple cavities of the nose, throat and ear as formerly understood, the limitation of the surgical aspect of oto-laryngology has necessarily widened until it has in recent years often been difficult to define, its boundaries have needed frequent revision, each new adjustment has included some new anatomical field until now it would seem that no rational limitation can be placed which does not include the surgery of the whole head and neck.

Dr. Joseph Beck, of Chicago, has advocated this widened scope in the surgical practice of the oto-laryngologist. In an address before the American Academy of Ophthalmology and Oto-laryngology in 1908 he enumerated eleven reasons why this type of surgeon should include in his operative practive the environmental surgery of the ear, nose and throat. Beck then stated that it was his opinion that those sufficiently trained in surgical principles and operative practice should undertake the surgery of the mouth and lips—cleft palate and hare-lip—the surgery of the brain, insofar as the brain disease has been caused by nasal or aural affections, excision of the superior maxilla, removal of enlarged and diseased cervical glands, goiter, the external operations of the larynx, esophagoscopy and bronchoscopy, and nerve splicing when required to cure facial palsy. The reasons given for the performance of these operations by the laryngologic surgeon were that such an operator is presumed to know the anatomy of the parts better, and his skill in handling delicate instru-

ments and reflected light should enable him to excel in this class of surgery.

I heartily approve of Doctor Beck's conclusion and believe that the best interests of all concerned will be served should we now look upon it as a settled fact that the surgical treatment of diseases of the entire environment of the ear, nose and throat, lies ethically and therefore rightfully in the domain of the oto-laryngologist. I would not, of course, advocate that all who practice oto-laryngology should undertake to perform the many difficult surgical procedures required in operations on the head and neck. It would seem, rather, that there should occur some line of cleavage in the ranks of our specialty that would be both natural as to the qualification of the individual and advantageous to the standard of our work. It is entirely probable that not all or even any considerable percentage of all who practice the specialty would profess sufficient qualification to undertake this major surgery, much of which is the highest type of all surgery. But to those who have had the rigid necessary surgical training, and who are willing to devote their entire time and energy to anatomical study and surgical progress, it would appear that their experience and training through all the stages of the practice of oto-laryngology should finally best fit them to do environmental surgery. The line of cleavage suggested would be one which divides the specialty into a class wholly surgical and a class which is largely therapeutic and non-surgical. Non-surgical treatment of the nose, throat and ear will no doubt be necessary in the future, as in the past, and such work would not only be well done, but better done by the laryngologist who is not surgically inclined but who seeks to develop the best in a therapeutic sense, and whose efforts are no longer divided between therapeutic and surgical methods of cure. On the other hand, those who have had ample surgical advantages and abundant clinical experience should in the interest of the patient and the conservation of their own energy, devote themselves wholly to the surgical side of the problem. This plan, if carried out, would serve the best interests of the patient in that he would on the one hand be saved from operations by those not best qualified to do them, while on the other he would gain by the greater experience and better judgment of the trained operator and one whose surgical efforts are not daily burdened with a large office practice principally devoted to the local treatment of non-surgical cases.

408 Pennway Building.

HYOSCIN AND MORPHIN AS A PRELIMINARY TO LOCAL ANESTHETICS.*

DR. LEE M. HURD, New York City.

The problems we have to meet in operations on the ear, nose and throat are the banishment of pain (physical) and the emotion of apprehension or fear (psychic).

Oto-laryngologists have long been adepts in local anesthesia, but we have been negligent in blocking the baneful influences due to fear. This state of acute shock, which varies from mild symptoms of syncope to profound exhaustion even to a fatal termination, is frequently observed during a supposedly safe and simple operation.

These fatal cases are often attributed to a lymphoid state, cocain poisoning, etc., whereas if the baneful influence of psychical shock had been eliminated there would have probably been no ill-effects.

We are much indebted to Crile for his studies on causes and treatment of shock. He found that it caused histological changes in the brain, the liver, and the suprarenal glands.

Shock may be produced by diverse causes, such as trauma, hemorrhage, fear, worry, infection, excessive muscular exertion, starvation, and insomnia.

The subject that immediately concerns us is to obliterate the baneful effects of the operative trauma and the emotion of fear and worry, preceding, during and after the operative procedure. Shock, due to other causes, is not germane to this paper.

The stimulation of the nerve-ceptors, both of the contact ceptor on the surface and of the special senses, causes a discharge of energy, if protracted enough produces the conditions called exhaustion or shock. The noci ceptors are most abundant in those parts of the body which in the course of evolution have most frequently been subjected to injuring contacts with the environment. There are specific noci-ceptors in the ear, nose and throat.

Fear is most powerful in its effects on the organism. Fear, accompanied by pain, may rapidly drain the dischargeable nerve energy to the condition of shock. The lack of faith, either justifiable or unjustifiable, on the part of the individual in his own ability to protect himself against real or fancied hostile environmental elements, is accountable for a large part of the apprehension.

We know that phlegmatic individuals are better subjects for

*Read before the American Academy of Ophthalmology and Oto-Laryngology, Boston, October 19, 1914.

surgical procedures than the nervous, therefore our aim should be to make the nervous type extremely phlegmatic.

The prevention of shock directly concerns us, and to accomplish this the consumption of nervous energy should be prevented, excluding all harmful physical and psychical stimuli from reaching the brain. This is done by blocking with the local anesthetic the field of operation and blocking the special senses with general narcotics. Hyoscin depresses the psychic and motor centers. This augments morphin in blocking off the special senses and reflexes. Morphin directly prevents shock (Crile)*

Application: The class of cases in which I have used hyoscin and morphin have all been good surgical risks. The worst cases were a few alcoholics and those with slight evidences of chronic toxemia. They have been the usual run of cases that come under the surgical observation of an oto-laryngologist, from submucous resection to sinus disease, ossiculectomy and malignancy of the larynx. I have never used hyoscin and morphin in the very old or in the very young.

There has been no alteration of diet. The drug has been usually given about two hours after luncheon. A state of mental quiet, where the individual has to make an effort to keep awake, with the mind free from apprehension and fear, and feeling happy and dreamy, is the ideal for which we strive. There may be a mild delirium, from which the patient will momentarily awake if spoken to loudly, and will do whatever is asked. In reaching this stage, there are no hard and fast rules for dosage or time.

I start with hyoscin hydrobromid, 1-100 grain and morphin ⅛ grain hypodermatically, after which I place the patient in quiet surroundings and under close observation.

The effects of the hyoscin are usually more pronounced than that of the morphin, the pupils dilating with some flushing of the skin and a dreamy and happy expression.

After thirty or forty minutes, if the patient still shows signs of apprehension or fear, I give from 1-200 to 1-100 grains more of hyoscin and from 1-16 to ⅛ grains more of morphin, but I vary the two drugs if the patient shows the effect of one more than the other. It may take from forty minutes to two hours to get the patient quite indifferent and in the state required for the particular operation. Naturally, a submucous resection will not require as deep an anesthesia as a case of sinusitis.

It takes considerable experience to get just the proper narcosis.

*The author has largely drawn upon the "Anoci association" of Crile, to whom he wishes to make grateful acknowledgments.

If the patient is insufficiently under, the harmful impressions conveyed to the special sense of instruments, blood and operative procedure will show in nausea, syncope, etc.; if too far under, the patient will go into deep sleep which is unnecessary. The field of operation is anesthetized as usual.

Personally, I have ceased using cocain, not that I have had a case of poisoning, but its exhilarating effect, in its first stages, is not wanted and the after-depression is sometimes very distressing to the patient. I use alypin in the same strengths as when using cocain with the same anesthetic effect. When an anesthetic is to be used hypodermatically, nococain or urea and quinin hypochlorid is preferred.

Advantages: All shock is avoided. The patients awake from the effects of the hyoscin and the morphin without any memory of the operation, or, if remembered, the recollection is not of an unpleasant nature. For instance, sometimes a patient will have the remembrance of some hard pulling or of having heard the breaking of a bone, but it will mean nothing to the patient.

Much more extensive work can be done than under a local anesthesia alone and with less ill-effects than with the use of a general anesthesia. I have done such operations as the Killian, double sinusitis *per nasam*, removal of large sequestae of lower jaw, repair and replacement of all the facial bones in a patient injured by the kick of a horse, ossiculectomy, etc.

Disadvantages: This operation takes much time and requires experience. The patient should be under the personal supervision of the physician from shortly after the first dose has been given until about an hour after the operation, which means that the patient requires attention from three to five hours.

The effects of this anesthesia differ widely, due to idiosyncrasy. I have had one failure in the case of an hysterical girl, who, when the operation was half over, broke out in tears and laughter, and was quite noisy for several hours. It is unsuitable for use in clinics and in most of the hospitals unless the surgeon or some one specially trained has the time to remain with the patient. The ordinary trained nurse does not appreciate the situation sufficiently to be left in charge, as the patient is not accountable for his actions.

Commercial hyoscin is not all alike; therefore care must be used to obtain a superior produce, and when once familiar with its action, stick to that one manufacturer. I use Merck's.

Two of my cases showed a marked fall of blood-pressure when sitting up, one, an alcoholic, had 3-200 grains of hyoscin and 3-16 grains of morphin, the other case, one of arterial sclerosis, had

1-50 grain of hyoscin and ¼ grain of morphin. The pulses immediately picked up after the operation, when the patients were put on their backs.

I might add that most of the cases were operated upon in a sitting position, which is not as favorable as having the patient lying on his back.

Another case of laryngo-fissure was awake and mentally bright after two doses of 1-100 grain of hyoscin and ⅛ grain of morphin, requiring a third dose—total of 3-100 grains of hyoscin and ⅜ grains of morphin.

Another case of frontal sinusitis required three doses to produce indifference, namely, one at 2:20 p. m., 1-100 grain of hyoscin and ⅛ grain of morphin, one at 2:50 o'clock, p. m., 1-100 grain of hyoscin and ⅛ grain of morphin, and one at 3:30 o'clock, p. m., 1-100 grain of hyoscin and ⅛ grain of morphin, after which, under alypin anesthesia, I removed the ethmoidal cells and opened the frontal and antrum into the nose, and removed dead bone which extended from the aveolar process into the antral floor.

The laryngeal case was talkative and remembered some of the operative incidents but not in an unpleasant way. The sinus case had complete amnesia.

I have used this method in a little over 100 cases in private practice. About 75 per cent of the cases were submucous resections, and the rest of the cases various conditions of the ear, throat and larynx. I have not used this method for any tonsil operations.

The dosage has ranged from 1-100 grain of hyoscin and ⅛ grain of morphin to 3-100 grains of hyoscin and 10-24 grains of morphin. In about 60 per cent of the cases 1-100 grain of hyoscin and ⅛ grain of morphin sufficed.

I appreciate that this is a limited number of cases from which to draw definite conclusions, and as the recorded results of others are not of a similar class of cases or of like dosage it is hard to draw any conclusion. The fatal cases reported show grave visceral lesions, extremes of age, or enormous dosage.

I do not advocate this method as a routine for all cases. We are using two powerful drugs. The phlegmatic patient will do well under local anesthesia alone, while the neurotic patient, who turns pale and is nauseated during a painless examination will hardly endure an operation with all of their special senses over-active, even if the operative field is free from pain, as there will be a nervous shock which can be prevented by using the above described method.

15 East Forty-eighth Street.

THE DEAF

Their Education—Improvement of Conditions—Responsibilities and Participation of the Profession.

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The aim of this department of THE LARYNGOSCOPE will be to bring to the notice of its readers from month to month, facts that may be helpful to physician and patient in dealing with the life-problems involved in deafness. Suggestions from readers will be gladly received and all questions answered to the best of our ability.

The Medical Inspection of School Children with Special Reference to the Medical Inspection of Deaf Children.*

At present the kind of work which is done is as follows: The children are examined on entrance to the school and two or three times during their school career. Nurses assist the school doctor in the examinations and supervise the personal hygiene and cleanliness of the children. Cases of infectious disease are found to account for a large number of absences from school, sometimes a sixth or more of the children being absent on this account during the year. Skin diseases are found to be common, ringworm as a rule heading the list. Treatment forms no part of the work of the school doctor. The parent is notified of the defect or disease discovered and asked to get medical advice. In this way dirty heads, defective vision, disease of the ear, of the nose and throat, of the skin, and of the teeth are brought under the notice of the parent.

In addition to this function of pointing out the existence of disease, with the object of getting the parent to undertake the necessary treatment, necessitous children are fed.

The only result of medical inspection which has not to be heavily discounted is the feeding of poor school children. The child's dinner is a sound investment, however poor his home or however

*Abstract of a paper read before the Seventh Biennial Conference of British Teachers of the Deaf, by Dr. James Kerr Love, Aural Surgeon, Glasgow Royal Infirmary.

careless his parents be. It is becoming a truism that medical inspection must be followed by the medical treatment of school children. But treatment is urgent, and if it is to be thorough and not wasteful of the time of the child it must be undertaken in or near the school.

The result of bad living conditions often referred to as physical degeneration are, so far as they have been observed, not handed down from one generation to another, but are wiped out with the birth of each generation, which writes its history on what, to begin with, is a clean sheet.

The children of the slums are nearly all born healthy—as healthy and free from disease as the children of the well-to-do. It would almost seem that should a child weather the greater dangers attending poverty and overcrowding during the first five years, he will turn out average in physique if we only feed him well. It must be a great incentive to social and educational reforms to know that the children of the slums are of the material from which a healthy race can be raised at once.

I think the death rate amongst very young deaf children is less than amongst very young hearing children, because the families into which congenitally deaf children are born are smaller than hearing families, and because a little deaf child is the object of more anxiety and of greater solicitude than is a hearing child. Except for the less developed brain, and therefore smaller head, the deaf child is, so far as physique is concerned, quite like the hearing child of school age—say 6 or 7 years—and if deaf children of school age are well fed and housed, the death rate amongst them is almost nothing.

The presence of deafness and the presumption of ear disease past or present raises these points: 1. How should the hearing of a deaf child or hard-of-hearing child be tested? 2. What are the evidences of ear disease in a deaf child?

You will expect me to deal with these questions from the teacher's point of view and not from that of the medical expert.

The only test of any real value for the hearing of a school child is the human voice. Shouting and ordinary conversation may both be used, but the best test is whispered speech, the whispering taking place at the end of the expiration. Forced whispering may be made of almost any loudness, but the whisper made by the air emitted from an almost exhausted chest is for adults singularly uniform in loudness.

Using such whispering as a test, I have formulated the following rule, which may be called the "six-foot rule."

When a child cannot hear whispered speech with at least one ear at six feet, he cannot with advantage remain in a class of an ordinary elementary school, and when an adult cannot hear whispered speech with at least one ear at the distance of six feet, he cannot without difficulty conduct the business of daily life.

Such a rule, is, of course, not absolute. I have a patient now, aged 17, who does not hear whispered speech at a yard, and yet she was top of her form last month in the Girls' High School in Glasgow. Again, I sometimes meet adults who lip-read so successfully that they conduct business with less than a six-foot range for whispered speech. But the rule is a useful one in practice when applied to the average child or adult.

Amongst deaf-mute children the degree of deafness cannot be tested by the whisper. The human voice or a bell will elicit proof of the presence of any useful hearing.

If you want to find the position of the hearing-island in deaf mutes you must use a much more elaborate apparatus, such as the tuning-forks. I do not think we fully appreciate the value of residual hearing in deaf mutes. Even when it is above the speech area and when no response to voice is given, it is of use, because some of the overtones of the child's own voice are heard by him and help him to a more natural voice. They guide his remaining sense of the pitch of his voice.

All tests should be applied so that the child cannot see the instruments of the operator, and control tests which emit no sound should form part of the examination. The ears should be tested separately, the ear not under examination being closed by the finger of an assistant.

Deaf children differ from hearing children in these points, apart from the presence of deafness and its consequences: 1. They have worse eyesight. 2. There is a larger number of mentally deficient children among them—about fifteen per cent. 3. Deafness, when congenital, is often hereditary and so persistently hereditary, in spite of a healthy environment, that congenital deafness becomes one of the chief objects of attention of the medical inspector of deaf children. Broadly speaking, as we have seen, poverty and overcrowding have no ancestry and no posterity, whilst congenital deafness often has both. The heredity of congenital deafness is therefore one of the most important discussions for the medical inspector of schools.

Regarding the hereditary element in congenital deafness, the first thing we medical men have to confess is that we know too little of the morbid changes on which congenital deafness depends to dogmatize much about it. The number of complete examinations of the ears of congenitally deaf people is very small. I mean clinically, pathologically they are complete.

The second thing we must admit is that, whilst congenital deafness is hereditary, there are far more deaf children born of hearing than of deaf parents, and it is far commoner for deaf parents to have hearing children than it is for them to have deaf children.

The third thing we have to admit is that congenitally deaf children are not usually mentally defective, and can be educated quite well to become self-supporting citizens.

Put in another way, congenital deafness is oftener sporadic than continuously hereditary, and congenitally deaf children are oftener mentally normal than mentally defective. I make these statements because I wish to define the field within which any practical proposals may legitimately operate. When one is dealing with a disease like tuberculosis, with multiple manifestations due to a single cause—the tubercle bacillus—his method of attack differs from that employed when he has to deal with an unknown cause or series of causes producing a single manifestation like the congenital deafness.

I think the following indications may serve for proof of heredity of such a degree as to require interference. 1. The birth to parents, one or both of whom are congenitally deaf, of a deaf child. 2. The occurrence in a family of more than one congenitally deaf child. 3. The occurrence in a family of more than one congenital defect: e. g., blindness with deafness, mental deficiency with deafness, or epilepsy with deafness. 4. The occurrence in one generation of congenital deafness, and in a previous generation of one of the other defects mentioned under heading 3.

Now I do not mean to say that congenital deafness occurring outside of these four groups is never hereditary, but these are what may be called badly tainted fraternities. Out of these groups come nearly all mentally defective deaf and nearly all the deaf who after the school period cannot support themselves.

There is no doubt that legislation for the reduction of congenital deafness will be very difficult. Eighteen years ago I read a paper on this subject to the Royal Society of Edinburgh. Lord Kelvin, who was president, and Lord McLaren criticised my proposals as harsh and execrable, and the Society asked me to remove certain passages from the paper. This I refused to do, but instead with-

drew the whole paper. Within a year I read the same paper to the first meeting of this Association which was held out of London—in Glasgow, in 1897—and, curiously enough, the paper was well received and its principle accepted by the Association. The principle was that, as some fraternities were so badly tainted that marriage amongst them was inadvisable, a commission should be appointed to consider how the reproduction of the unfit could be prevented.

I look forward with every hope. There will come a time when deaf children will be comparatively few. By the advance of sanitary science and by the better housing of the people the diseases which cause acquired deafness will diminish, and some of them will disappear. By the exercise of a wise restraint, encouraged and if necessary enforced by the state, congenital deafness will diminish, and the deaf will number, not 1-200, but 1-4000 of our population. But we shall always have some deaf children. This smaller number of deaf children will be better educated than the deaf child of to-day. The highest that is physiologically possible will be got for every deaf child.

CONCLUSIONS AND RECOMMENDATIONS.

1. The medical inspection of elementary school children as at present carried out is doing some good, but its effects are much stultified by the facts that the treatment is seldom carried out, and that school children are very, very poorly housed.

2. Attached to every institution and day school for the deaf should be an aural surgeon, who should examine all children admitted, and who in a properly equipped room should carry out such treatment as cannot be carried out at home.

3. All teachers, whether of the deaf or of the hearing, should be instructed in the methods of testing the deafness by means of the human voice and of whispered speech.

4. Whilst legislation for the extinction of congenital deafness does not seem practical at present, much may be done towards the diminution of congenital deafness by the permanent segregation of the mentally defective deaf. The study of congenital deafness with a view to preventive treatment and of necessary legislative action should be assiduously carried on.

SOCIETY PROCEEDINGS.

PHILADELPHIA LARYNGOLOGICAL SOCIETY.

Regular meeting, October 6, 1914.

DR. GEORGE M. COATES, Chairman.

Routine Use of the Bronchoscope in the Out-patient Department. Dr. ROBERT F. RIDPATH, Philadelphia.

Published in full in this issue of THE LARYNGOSCOPE, *p. 942.*

DISCUSSION.

DR. FIELDING O. LEWIS: This was the most excellent and instructive demonstration given. There are two things I should like to mention: In introducing the tube there is a certain amount of pressure in old people liable to raise arterial tension, cardio-lesions and aneurysm, sometimes risky. There is no doubt that those practicing scientific laryngology must have some knowledge of bronchoscopy. There should be greater light at the proximal end of the tube rather than at the distal, and the secretion there is not so great. Dr. Ridpath speaks of the routine use of the bronchoscope, does he mean using it in all cases in the nose and throat clinic presenting laryngeal symptoms?

DR. GEORGE M. COATES: I used the Jackson bronchoscope for many years. It was a distinct advance over any scope used previous to that time. With the Collier-Brunner you get a larger field and better light and you are not bothered by a small light burning out. Secretions get in and short-circuit the lights.

DR. R. F. RIDPATH: By routine treatment I mean only routine treatment of patients showing laryngeal symptoms, asthma, dyspnea, chronic cough, or something which warrants the use of the bronchoscope. All aged patients are given a thorough heart and lung examination before the use of the bronchoscope.

The Preturbinal Operation on the Maxillary Sinus. Dr. Ross Hall SKILLERN, Philadelphia.

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DISCUSSION.

DR. COATES: In discussing the merits of any operation we must consider the indications for the operation, whether internal or external. Any operation that can be done through the nose without the destruction of tissue should be done. Many cases we have failed to cure and have had to resort to incisions through the antrum and nose. The Canfield operation sounded good at first, but it must be difficult to perform. This pre-turbinal operation is really quite a distinct operation and fulfills all the indications that the other operations do. We can get free drainage, free opening into the sinus. We have drainage as long as we want it; until the sinus is in condition to take care of itself. When the disease is cured, the opening closes up and we have no loss of tissue. Often we cannot tell which side of the nose has been operated on. Is it feasible? Can it be done as easily for the patient and as easily for the operator?

There is no discomfort to the patient, less than in other operations similar to it. In this operation in contra-distinction to others through the nose, the site of operation is in view all the time; spindle piece of tissue taken out is a very necessary step; the view of the antrum is truly wonderful; the condition of the mucosa is made visible; polypoid degenerations and other parts which cannot be seen are made visible by the use of the naso-pharyngoscope.

Dr. Skillern's results have apparently been almost perfect and the cases apparently stay cured. There is no going around corners with packing and is more convenient for patients. The operation is best done with a drill or trephine. There is only one point against it, especially if you have no trephine in the dispensary. By the use of the trephine there is less chance of driving spicules in the antrum. Once this operation is learned, it ought to supplant all other nasal operations.

DR. ALEXANDER says he cannot see how Dr. Skillern's operation can take the place of the Denker. Speaking of spicules of bone, of the trephine slipping in the maxillary sinus, and the mere fact that you have to do a Denker afterwards, speaks for itself of the advantages of the Denker. The Denker reaches the most remote parts; you can see all over the sinus; can wash out just as thoroughly and directly. In using peptone with novocain, peptone often causes infection. In using novocain you do not need to be afraid of using it liberally, 6 cc. of novocain is all that is necessary to do a Denker operation and as to the toxic effects of novocain as a reason for wanting to keep it localized, I cannot see the reason. It is not absorbed that rapidly. There is no real reason to keep it in one spot.

DR. RIDPATH: One of the disadvantages of the Denker and Canfield operations is the incision through the canine fossa. No matter how careful you try to be, once in a while we do have a fistula or opening formed. It also gives trouble with healing. I have two cases with small fistulas that I am trying hard to cure. The incision through the antrum into the nose heals up very rapidly, quicker in fact than the curing of the disease. Although the opening is small, practically all the walls of the antrum may be seen. Curetting can be easily done. The advantages are numerous: We do not have any fistula forming; we have the opening anterior to the inferior turbinate, therefore any discharge goes out anteriorly and does not flow back as in the Denker and Canfield operations; there is no destruction of the mucous membranes of the nose.

DR. R. H. SKILLERN: As far as the operation versus the Denker is concerned, I might say that this operation is by no means made to supplant any of the external radical procedures. In operating on the maxillary sinus you must use judgment and the form of operation is one of personal equation. I should not use my operation in old chronic cases. As far as novocain is concerned, Dr. Alexander is very sanguine about its use. If used freely toxic symptoms will result, it is seventy per cent as toxic as cocain. Any of these drugs injected are dangerous. Action is better when peptone is used than without it. I have never yet seen a case with toxic results; I often use it in my tonsillectomies and have never heard of infection following its use. The only reason for infection is the fact that the solution is not sterile.

BOOK REVIEWS.

History of Laryngology and Rhinology. By Dr. Jonathan Wright, New York. Second Edition, revised and enlarged, pp. 357, illustrated. Cloth, $4.00. Lea and Febiger, Philadelphia, 1914.

In recent years there has been manifested a great increase in the interest shown by the American medical profession in matters pertaining to their science. Most of the large medical schools provide courses of lectures on the history of medicine, many articles pertaining to it appear in the medical journals, and some interesting and valuable books have been published. Most of the American publications have, however, been of a biographical nature. In Germany and France, on the other hand, the scientific study of what may be termed the philosophy of medical history has for many years been pursued with much ardor and most valuable results. Dr. Wright's work is a successful attempt in that direction. In this, the second edition of his book, he has not only added to the material included in the first, but also broadened its scope and improved it in many directions. The text of the first edition was originally published in the columns of The Laryngoscope and attracted at that time much favorable comment. Its author is too well known for his original research work and his scholarly attainments to require any introduction to his readers.

In the pages before us he first collects the scanty references to rhinology and laryngology to be found in the writings of the ancients and shows how even from the oldest known medical authorities something of interest may be gleaned. Continuing down through the centuries he reviews in an exhaustive manner every step until the science of laryngology becomes an established entity, and then goes on to the present year of grace with what constitutes an invaluable guide to the reader who wishes to find out the beginning of any of the great steps which have led to our present achievements. Throughout, the work forms a connected whole and not its least valuable parts are the pages in which contemporary influences on the progress of medicine in general are narrated.

Only those who have attempted the study of medical history in its relation to the other sciences and to the general intellectual development of the world can fully appreciate how much labor and research these brilliantly written pages manifest. The book is one which should be constantly consulted by every writer on subjects pertaining to laryngology in order that some of the frequent errors made by those who content themselves by merely reviewing the modern writers on the subject may be avoided.

Long before the discovery of the laryngoscope much good work had been done by pioneers in the field of diseases of the nose and throat and yet how few of our profession, to their shame be it said, ever refer to their labor.

Dr. Wright has evidently consulted the authors of the past at first hand, and consequently has avoided the snares which entrap those who content themselves with compiling their records from the pages of others. He merits the sincere thanks of the entire medical profession. It is to be hoped that his labors may stimulate others to undertake work of a similar nature in other specialties. Packard.

IN MEMORIAM.

John Lanson Adams, M. D., was born August 9, 1860, at Westport, Connecticut. He received the degree of A. B. at Yale, in 1883 and entered the College of Physicians and Surgeons in New York after graduation, receiving the degree of M. D. in 1886. He then served for eighteen months as an interne in the New York Hospital.

After leaving the New York Hospital he served on the House Staff of the New York Eye and Ear Infirmary until 1888, when he went abroad to continue his studies. He returned in 1890 and was appointed Attending Surgeon in the Aural Department of the New York Eye and Ear Infirmary, where he remained until his death on September 25, 1914.

Dr. Adams was a member of the New York Academy of Medicine, American Laryngological, Rhinological and Otological Society, American Otological Society, American Ophthalmological Society, New York Otological Society and the American College of Surgeons.

At a meeting of the Board of Surgeons of the New York Eye and Ear Infirmary, held on Tuesday, October 20, 1914, the following resolutions were adopted by the Board:

Whereas, The death of Dr. John L. Adams has removed from among us a distinguished and admired colleague, and has deprived us of a wise counselor and an honored friend.

Resolved, That the Board of Surgeons of the New York Eye and Ear Infirmary desires to express its sincere appreciation of the high professional attainments of Dr. Adams and its profound sympathy with his bereaved family.

Resolved, That in the death of Dr. Adams, otology has lost the services of an able practitioner who was at all times an earnest student and an ornament to his profession.

Resolved, That these resolutions be spread upon the minutes of the meeting of the Board of Surgeons of the New York Eye and Ear Infirmary and that an engrossed copy of the same be transmitted to the family of Dr. Adams, as a token of respect.

Committee appointed to draft resolutions.

FRED. WHITING,
E. B. DENCH,
GORHAM BACON.

In the death of Dr. Adams all institutions concerned in the welfare of the deaf and in advanced methods of teaching the deaf, have lost an ardent and active friend. Dr. Adams was elected as chairman of a special committee from the Section of Otology of the American Medical Association to investigate and promulgate the teaching of the deaf in medical schools and to stimulate the otological department in every university to include in its lecture-course at least one address, to each medical graduating class, on the deaf child, his classification, disposal and education, and a syllabus of such subject-matter has been prepared by his committee and sent to the medical department of every university in the United States and in Canada. Otology will miss his able representation in this important constructive work, which has for its ultimate purpose the active and practical enlistment of the medical profession in this glorious cause.

M. A. G.